FIG. 4. THE BUND, SHANGHAI

Applications in Building and Foundations of Modern Engineering Construction

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PART I.—THEORY.

SOILS in nature which we sometimes have to found on or retain may be said to lie somewhere between the following four extreme cases :—

(*a*) Those possessing neither cohesion nor friction.

(*b*) Those possessing friction but no cohesion.

(*c*) Those possessing cohesion but no friction.

(*d*) Those possessing cohesion and friction.

The first of these (*a*) *are liquids*.—For stability of a foundation for vertical loads, the depth of the foundation below the free surface must be

$$h=\frac{p}{w} \quad . \quad . \quad . \quad . \quad (1)$$

Where h = depth of foundation below free surface in feet, p = pressure on foundation in lbs. per square foot, w = weight of soil *above* foundation in lbs. per cubic foot. In other words, the pressure on the foundation must equal the pressure in the soil at this depth due to the weight of earth above it.

$$p=wh \quad . \quad . \quad . \quad . \quad . \quad (2)$$

This pressure will be referred to as the hydrostatic pressure of the soil at this depth. Values are given in Table I.

TABLE I.

Hydrostatic pressure at various depths in soil weighing 120 lbs. per cubic ft.

$p=wh$

Depth in feet.	Pressure in Lbs. per sq. ft.	Pressure in Tons per sq. ft.
0	0	0
5	600	·27
10	1,200	·54
15	1,800	·80
20	2,400	1·07
25	3,000	1·34
30	3,600	1·61
35	4,200	1·88
40	4,800	2·15

If the foundation is at a less depth than given by 1 then the foundation will sink, and if it is at a greater depth it will rise. It must be exactly at that depth, neither more nor less, and is exactly in the condition of a ship which rises and falls in its foundation according as the load in it increases or decreases.

It may be considered a stretch of imagination to consider a pure liquid as the limiting condition of a soil, but the properties of a liquid are approximated to by soft mud which is sometimes found on the banks of rivers which have passed through clay deposits. The Thames is a notable case in

point, and the mud on many of the marshes between Greenhithe and Sittingbourne approximates closely to this condition below the top surface, sometimes for a depth of 25 feet or so.

Pressures against retaining walls built in front of this material approximate closely to the pressures which would exist if these walls were retaining liquid, and embankments built on these marshes have to be given an extremely flat slope if they are to be free from risk of failure and even then they settle continuously. The river wall along these marshes is constantly settling and men are constantly employed in raising it.

The second of these (*b*), those possessing friction but no cohesion, were considered in great detail by Rankine. These conditions are practically fulfilled in the case of loose dry sand which is a perfectly reliable foundation in spite of Biblical suggestion to the contrary provided it is free from risk of erosion or having its conditions disturbed in other ways, and providing the depth of the foundation is arranged at a proper level.

Rankine showed that for stability the depth of the foundation below the free surface must be

$$h=\frac{p}{w}\left(\frac{1-\sin\theta}{1+\sin\theta}\right)^2 \quad . \quad . \quad . \quad . \quad (3)$$

where h, p and w have the same significance as before.

θ is suggested by Rankine to be the angle of repose of the material, that is to say the greatest slope to the horizontal at which the material will stand. Subsequent experiments have shown, however, that the pressures calculated from this formula agree much better with experience if θ is taken as the angle whose tangent gives the co-efficient of friction of the material, that is the relation between the force required to produce lateral motion across a horizontal section of the material, to the vertical force across that section. The formula in (3) gives the least depth at which such a foundation is stable, and if a foundation is placed at a higher level it will sink down to this depth. Any depth below this level will also be a stable foundation until the maximum permissible depth is reached, when h has the value in equation 4,

$$h=\frac{p}{w}\left(\frac{1+\sin\theta}{1-\sin\theta}\right)^2 \quad . \quad . \quad (4)$$

and if this is exceeded the foundation would then tend to rise as the upward pressure would be greater than the downward weight.

As compared with a liquid, the permissible depth instead of having the definite figure of

$$h=\frac{p}{w}$$

may now lie anywhere within a certain range, partly above this depth and partly below it, and in proportion as the depth differs from

$$h=\frac{p}{w}$$

we rely upon the friction of the material to secure stability. Rankine understood quite well that these formulæ were only properly applicable to soils which approximated to his assumptions that there should be no cohesion, and that the particles were prevented from moving only by friction. Nevertheless his formulæ have since that date been somewhat indiscriminately applied to soils which do not approximate to these assumptions, such for example as clay.

Clay is a material with a quite definite and considerable cohesion, as is quite clear to a navvy attempting to cut it with a spade, who has to exert considerable force in shearing through the material.

It is clear from an examination of formula 3 that a soil of this character will carry no load if placed on the surface, because if h is 0 clearly p must be 0 also.

This confirms our experience when dealing with dry sand, as anyone who has walked across a really dry sandy beach will remember. θ* for clean sand has values varying from about 65° for the dry material, gradually increasing to about 69° as the percentage of water increases to about 21 and then gradually reducing to about 62° when the sand is saturated with water. This increase in θ is no doubt due to the surface tension between the particles when it is moist, which gives it something approaching cohesion.† This again is within our common experience, as anyone who has tried to make sand castles at the seaside will remember, as damp sand can be made to stand with a vertical face, whereas very dry or very wet sand both refuse to do so.

* See the paper on "Experiments on Earth Pressures" by P. M. Crosthwaite, for the Institution of Civil Engineers, 1916.

† It would therefore be more accurately dealt with as a cohesion, in the manner suggested for case (*d*).

It is not advisable for the height of a foundation to differ from its most stable position

$$h = \frac{p}{w}$$

to the full extent of the expressions represented by equations 3 or 4 because there would in that case be no factor of safety, and a foundation should be lower than the upper limit or higher than the lower limit by an amount depending on the factor of safety desired.

Rankine may perhaps be slightly to blame for the misuse of his formulæ to soils to which they do not properly apply, because although he recognised that most actual soils, except pure sand, have cohesion, he considered that such cohesion is liable to be broken down by the action of water and frost, and that therefore the only thing which could be relied upon for *permanent* stability was the friction. This of course is not so, since a foundation on blue clay, for example, at a considerable depth is sufficiently protected against the action of both frost and water to retain indefinitely any cohesion which it may possess.

If Rankine's formula were really strictly applicable to ordinary soils other than sand or soils approximating thereto then the safe pressures would always be given in terms of the depth in accordance with equation 3.

Table II gives the safe pressures on soils of different depths calculated in accordance with equation 3, taking w, the weight of the material, as 120 lbs. per cubic ft. and θ which I will call the friction angle as 30° and 60° respectively.

TABLE II.

Maximum carrying capacity* of loose granular material without cohesion at various depths from Rankine's formula

$$p = wh\left(\frac{1 + \sin\theta}{1 - \sin\theta}\right)^2 \text{ taking } w = 120 \text{ lbs./cu. ft.}$$

	Carrying capacity with $\theta = 30°$.		Carrying capacity with $\theta = 60°$.	
Depth in feet.	Lbs. per sq. ft.	Tons per sq. ft.	Lbs. per sq. ft.	Tons per sq. ft.
0	0	0	0	0
5	5,400	2·41	116,400	52
10	10,800	4·82	232,800	104
15	16,200	7·23	349,200	156
20	21,600	9·64	465,600	208
25	27,000	12·05	582,000	260
30	32,400	14·46	698,400	312
35	37,800	16·87	814,800	364
40	43,200	19·28	931,200	416

* These figures must be reduced by a suitable factor of safety for working pressures.

As previously stated, these pressures would not be safe as they would contain no factor of safety, but even if they were halved or divided by three they will be seen to produce figures which startle one. In particular, the tremendous increase with increasing value of θ is startling.

In the author's view the higher pressures indicated at the great depths would not ordinarily be suitable on building foundations as they would be accompanied with a considerable settlement owing to the consolidation of the particles. He knows of no case where foundations on sand or material without cohesion has exceeded 12 tons per sq. ft. at any depth.

It must be remembered that loose sand—to which alone these formulæ strictly apply—has voids between the solid particles varying from 40 to 20 per cent. or less, depending on the grading of the particles. It is therefore clear that considerable movement may take place owing to this consolidation which is ignored in the Rankine formulæ. Rankine assumed the material is incompressible, but at high pressures it would compress considerably.

Consider a material like sand making only point contact between its particles. It is clear that if there is a pressure of say 10 tons per sq. ft. on the foundation then the pressure of contact between the particles would be more than 10 tons per sq. ft. in proportion as the area of contact is less than the area of the foundation. Taking this ratio to be only one-third, the stress on the material would be at least 30 tons per sq. ft. The author would consider 10 tons per sq. ft. on a material like sand an upper limit irrespective of Rankine figures. Higher pressures would have an insufficient factor of safety against fracture of the sand particles and would produce settlement.

The L.C.C. Regulations give a maximum of 2 tons per sq. ft. on brown clay and 4 tons on blue clay or ballast. No mention is made of the depth of these materials, so that on the L.C.C. basis the stability would not appear to depend on the depth at all.

In the author's view this is overstating the facts in the other direction, and the author would consider it at least permissible, with suitable safeguards, to allow an increase of pressure of

$$p = wh \text{ (given in Table I)}$$

over and above what the same soil is capable of resisting near the surface; in other words, to add

the hydrostatic pressure to its carrying capacity near the surface. This he is convinced is absolutely conservative and makes no additional demand upon either friction or cohesion over and above what is already resisted by the material at the selected pressure at small depths. In other words, if a certain ballast or clay were found to be capable of resisting 2 tons per sq. ft., say at a depth of 4 ft. (the depth should, of course, always be below the

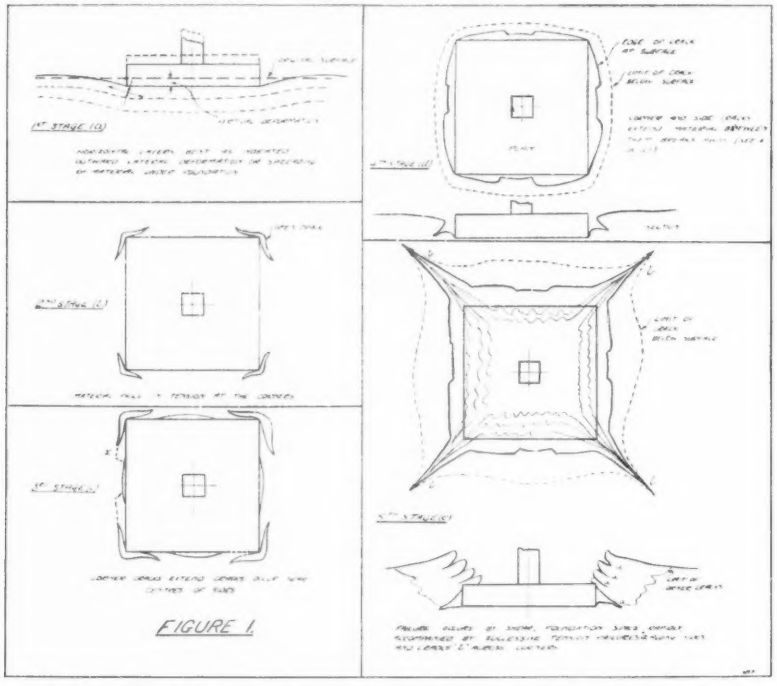


FIG. 1.—SOILS POSSESSING COHESION BUT NO FRICTION. FIVE STAGES OF FAILURE

frost line or the line above which the clay is affected by seasonal variations of moisture contents), then the same soil at a depth of 30 ft. would be capable of carrying an additional $1\frac{1}{2}$ tons per sq. ft. without making any greater demands on the material either by way of friction or of cohesion.

An examination of this Table I will show that these figures are quite important. In many cases it would even be safe to exceed them, but they at least are in the author's view conservative.

The depth must, of course, be measured from a surface which exists at the time of building and can reasonably be relied upon to remain for the lifetime of the building. It is clear, for example, that if a building be founded on a material approximating to Rankine's assumptions, viz., loose sand, and a pressure were adopted, depending on a certain height of material above the foundation, and this were subsequently excavated away for an adjacent building, or for any other reason, the foundations of the first building would be jeopardised even if the foundations of the second building went no deeper and possibly not so deep as those of the first building.

Fortunately we do not in practice often deal with materials like sand, and therefore the point is not so important as it otherwise would be, but it is interesting to remember that for such a material the load is in this sense carried by the material above the foundation just as much as by the material below it.

Enough has perhaps been said to show that Rankine's formulæ lead to results which, though useful and interesting, and nearly true for loose sand, are widely discordant with our experience on com-

mon soils. The common practice of applying them to all soils is therefore ridiculous and should cease.

Coming now to class (*c*), *soils possessing cohesion but no friction*.

It is curious that no study appears to have been made of these, yet they are instructive and interesting.

A soft clay with considerable water contents approximates much more closely to this case than to a material obeying Rankine's formulæ with a low value of θ.

The author has therefore made an experimental study of this class of material, which, not being complete, he will only refer to in a general way.

The nearest approach that he knows of an actual material to the condition of the ideal material possessing cohesion but no friction is jelly. The fact of cohesion in this material is evinced in the fact that loads may be placed on it without settlement (though not without slight deformations which are common to all solids under stress), and by the fact that it will stand up with a vertical face.

The comparative absence of friction is evinced by the way vibrations in the material continue undamped, and it is well known that damping of vibration is a measure of friction. Jelly as an experimental material has the great advantage that cohesion can be varied (by varying the gelatine contents) and what happens below the surface is readily seen.

Fig. 1 illustrates what happens when a square foundation resting on such a material is loaded with a gradually increasing load till failure occurs.

The Figure needs little explanation. It is remarkable that the increase of deformation with increasing load is almost constant through all the stages 1 to 4. When stage 5 is reached, the foundation punches its way to the bottom. Failure occurs when the horizontal layers, which are clearly lengthened under deformation, are stretched more than they will stand. This naturally occurs first at the corners where the lengthening is greatest.

The failure seems to suggest two things.

(1) That as final failure occurs by a kind of shear or punching, the breaking load might vary with the periphery rather than with the area. In other words, that if foundation A is 5 ft. sq. and B is 10 ft. sq., the breaking load on B might be nearer twice that on A rather than four times. My experiments so far indicate that it lies somewhere between the two, but more experiment is required and is under way.

(2) That foundations rounded in plan and having the bottom edge rounded might carry higher loads. This also needs more experiment and this is in hand.

My paper would be too long if I attempted here anything more than a brief mention of these matters.

A mathematical analysis indicates that a material having cohesion but negligible friction will have a carrying capacity of

$$p = wh + 4k \quad . \quad . \quad . \quad (5)$$

where k is the shear resistance of the material.

The shear strength of the clay in any particular foundation can be measured by experiment.

Values given by A. L. Bell, M.Inst.C.E.,* are as follows :—

	Tons per sq. ft.
Very soft puddle clay	0·2
Soft puddle clay	0·3
Moderately firm clay	0·5
Stiff clay	0·7
Very stiff boulder clay	1·6

This table is difficult to apply because the description is insufficient, but tests can be made on the actual material of a foundation.

Taking the values of ·7 for stiff clay to which he refers and ignoring any friction, the carrying capacity at various depths would work out as in Table III.

TABLE III.

Carrying capacity at various depths of soil having shear strength of 0·7 ton per sq. ft. and negligible friction

$$p = wh + 4k$$

Depth in ft.	Carrying capacity. Lbs. per sq. ft.	Tons per sq. ft.
0	6,270	2·8
5	6,870	3·07
10	7,470	3·34
15	8,070	3·60
20	8,670	3·87
25	9,270	4·14
30	9,870	4·41
35	10,470	4·68
40	11,070	4·95

In his experiments, Mr. Bell found that stiff clay had some friction, which has the effect of increasing the carrying capacity with increasing depth more than is indicated by Table III.

It will be seen that these figures agree much more closely with our experience with common soils than those in Table II, based on Rankine's formula, showing again that the assumption of cohesion without friction is a closer approximation to fact for

* Paper before Inst. Civil Engineers, 1914.

common soils and particularly clay than Rankine's assumption of friction without cohesion.

Soils possessing cohesion and friction (*d*).—I now come to our final classification. This, with suitable values for the cohesion and friction, is applicable to all soils. Mathematical analysis shows that the maximum pressure on a foundation at a depth h is given by

$$p = wh\ tan^2\left(\frac{\pi}{4}+\frac{\theta}{2}\right) + 2k\ tan^3\left(\frac{\pi}{4}+\frac{\theta}{2}\right) + 2k\ tan\left(\frac{\pi}{4}+\frac{\theta}{2}\right). \quad . \quad . \quad . \quad (6)$$

where k is the shear strength of the soil and θ is the angle whose tangent is the coefficient of friction of the material. Both these can be measured and tested on an actual soil. All the preceding formulæ can be derived from this.

Putting $k=0$, and $\theta=0$, it reduces to

$$p=wh \quad . \quad . \quad . \quad . \quad (2)$$

Putting $k=0$, it reduces to

$$p=wh\left(\frac{1+sin\,\theta}{1-sin\,\theta}\right)^2 \quad . \quad . \quad (3)\ (\textit{slightly rearranged}).$$

$$\left[\text{since } \frac{1+sin\,\theta}{1-sin\,\theta}=tan^2\left(\frac{\pi}{2}+\frac{\theta}{2}\right)\right]$$

Putting $\theta=0$, it reduces to

$$p=wh+4k \quad . \quad . \quad . \quad . \quad (5)$$

our formula for cohesion without friction.

Table IV shows the result of applying this formula to a soil having a shear strength $k=0{\cdot}7$ ton per sq. ft. and a friction angle $\theta=7°$ which Mr. Bell gives for a particular "stiff clay."

TABLE IV.

Carrying capacity at various depths of soil having a shear strength of 0·7 ton per sq. ft. and a friction angle of 7°.

(See formula 6.)

Depth in ft.	Carrying capacity. Lbs. per sq. ft.	Tons per sq. ft.
0	8,060	3·6
5	9,040	4·04
10	10,020	4·48
15	11,000	4·91
20	11,960	5·34
25	12,950	5·78
30	13,930	6·23
35	14,910	6·66
40	15,900	7·1

It will be seen that the results divided by a factor of safety of 1·5 would agree well with our experience of London blue clay.

The formula is, however, equally applicable to ballast and other soils by using the appropriate constants which can be ascertained by testing for any actual material.

Formulæ 5 and 6 avoid a difficulty which many designers must have felt which may be expressed as follows.

A certain foundation carrying, for example, 200 tons is desired to be founded at a certain level on a foundation 10 ft. sq., giving 2 tons per sq. ft. At this level, however, the soil is not considered good enough to carry 2 tons per sq. ft. and the hole has then to be carried down an additional 20 ft. in depth before a satisfactory soil is reached. At the lower depth the foundation, however, now has to carry not only the original 200 tons but also the weight of the material forming the pier between the higher level originally contemplated and the lower level. This may form a considerable proportion of the 200 tons to be carried and therefore the pressure per sq. ft. at the lower level will necessarily be greater than what it was at the higher level.

A strict interpretation of the Building Act as it stands at present would not allow of this increase of pressure, yet it is quite clear that had the foundations been founded at the higher level then the soil at the lower level would in point of fact have carried it plus the 20 ft. of earth intervening; and, therefore, it is quite reasonable to take the carrying capacity of the soil at the lower level as 2 tons per sq. ft. plus the weight of the soil between the two levels. This is exactly what the formula 5 does.

PART II.—PRACTICE.

In presenting this portion of the paper to the Institute, the author realises that many of the subjects and examples on which he proposes to touch briefly will necessarily be quite familiar to some of his audience.

The design and construction of foundations has been subject to gradual growth and development as fresh problems presented themselves with the taller and heavier structures which are now demanded, and also as a result of comparatively modern materials such as steel and reinforced concrete. It is hoped, nevertheless, that to some at least of the audience a description of actual difficulties experienced in practice and the methods by which they were solved may at least be suggestive and serve a useful purpose.

Ferro-concrete Rafts.—The author in his practice has been much impressed with the virtues of ferro-concrete rafts in many situations for solving foundation problems. As ferro-concrete itself is for practical purposes only from 20 to 30 years old, such construction may legitimately be considered to be modern.

Among the principal advantages of concrete rafts as foundations may be included the following :

(1) The pressure is distributed over the maximum possible area of soil, and therefore the pressure per sq. ft. is reduced to a minimum.

(2) Any tendency to unequal settlement is minimised, as a raft properly designed has a certain power of bridging over soft places and applying the loads to those parts best able to receive them.

(3) The raft also forms a tie preventing the lateral spreading of foundations which is sometimes important.

(4) In the case of buildings with deep basements, where the lower floor is frequently far below water level, some sort of raft construction is necessary to receive the upward water pressure and prevent it from flooding the basements. In these cases the raft and the retaining walls form together a box which, by means of asphalte or other means, is rendered watertight.

Reviewing these points in detail, it frequently happens nowadays that a soil which would be quite insufficient with the normal pressures which isolated foundations would produce on the soil can be founded upon quite safely under a well-designed raft, and so avoid the necessity for sinking to great depths to secure a foundation of sufficient carrying capacity. The saving will, of course, depend on the depth at which this better foundation is found, and is, of course, enhanced when special difficulties such as water and perhaps the necessity of underpinning surrounding buildings are entailed in this process of digging to great depths. It frequently happens that a concrete raft can also be used as a floor in the building, and so increased economy is obtained. It some-

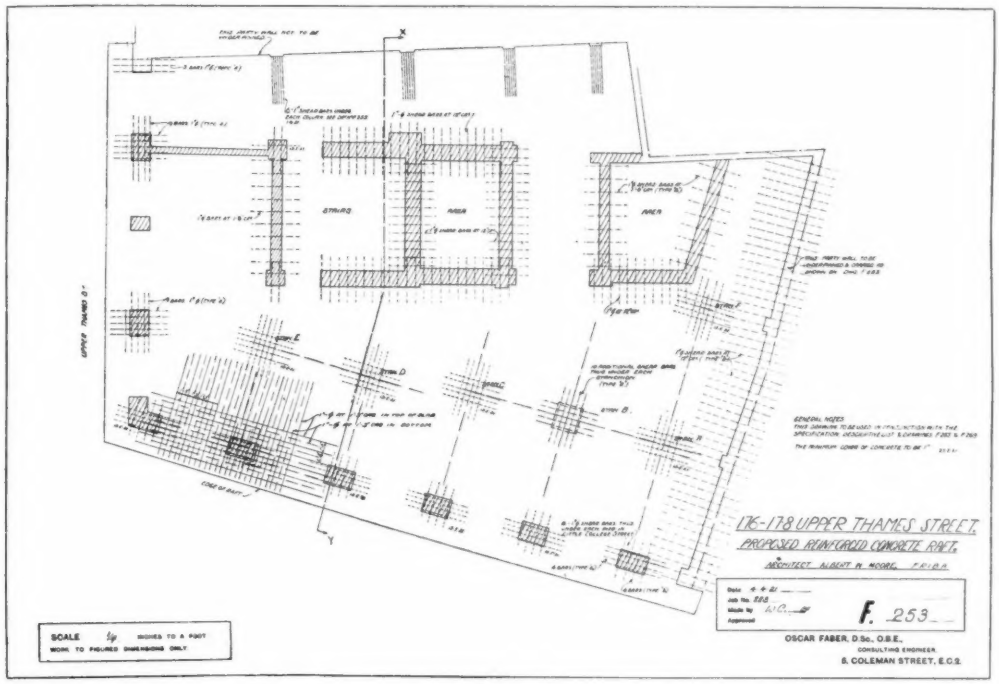


FIG. 2

times requires a good deal of courage to found on soils which in the ordinary way would be considered quite dangerous, and yet the author's experience is so favourable with these concrete rafts when properly designed as to give him a great deal of confidence.

In the case of a large warehouse of six storeys in Lower Thames Street, for which Mr. Albert Moore, F.R.I.B.A., was the architect, it was found on examining the foundation soil that it consisted of black river mud, and a trial hole indicated that it would be necessary to take the foundations down a matter of 12 ft. below the basement floor and into water before a satisfactory soil in the ordinary sense would be reached.

After some consideration it was decided to float the building on a concrete raft on the black mud at the higher level. It was found that the pressure per sq. ft. under this raft would be of the order of 1,700 lbs. per sq. ft., which the writer considered would be safe for the mud in question, though he would not have dared to use it under isolated foundations. Figs. 2 and 3 show details of this raft.

The builder in question was so alarmed at the instructions he received to construct this raft on the black mud that he caused his solicitor to write letters of protest to the architect and to disclaim all responsibility for all the terrible things he was certain would result. He followed this up by having levels taken at each stanchion every week. During the construction of the building he continued this, which was no doubt a very wise precaution from his point of view under the circumstances, but about a year after the completion he came to express his amazement of the fact that there had not been 1-16th in. movement that he had been able to detect with his levelling.

A very large saving to the client resulted from this method of dealing with the problem, and I think most of us would have hesitated to found a building on this mud in any circumstances.

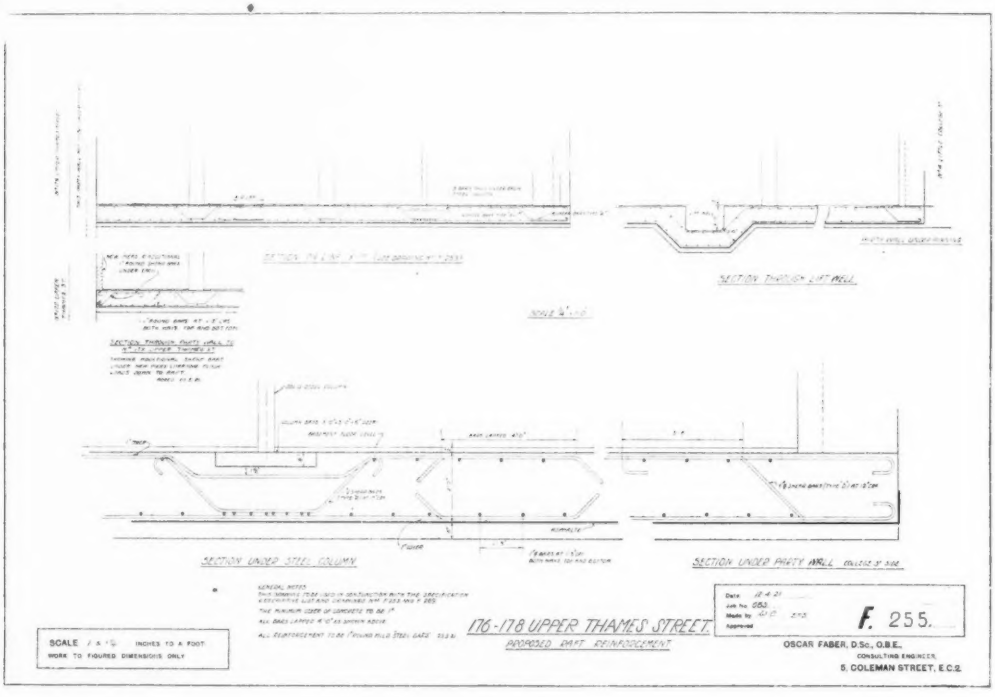


FIG. 3

Perhaps one of the most interesting applications of rafts of this kind is to the large and important buildings being erected in Shanghai. The soil here consists of a sandy clay brought down by the Yangtze River quite recently, geologically speaking, and contains so much water still as to be properly described as soft mud. The top 6 ft. has dried out a little more than below. Bore-holes have been sunk to a depth of over 400 ft., but instead of coming across more solid strata the material remains soft mud for the whole of this depth. The amazing thing is that on this soil magnificent large modern buildings, equal in size and magnificence to anything we are erecting in England, are being built (see Fig. 4). The construction in every case takes the form of a reinforced concrete raft spreading the load over the whole area of the site and somewhat beyond it. This raft takes a certain proportion of the weight of the building, and the rest is carried by piles driven into the ground before the raft is built. These piles do not rest on anything more solid, but add considerably to the resistance in virtue of the additional skin friction between them and the mud, or, looking at it from another point of view, they transfer part of the pressure from near the surface where the carrying capacity of the soil is low to a lower level where the soil is quite as soft, but has a higher carrying capacity by virtue of its depth, as previously explained.

It has been my privilege to be associated with the firm of Messrs. Palmer & Turner, of Shanghai, in the construction of the Hong Kong Bank, the Chartered Bank, and the Yokohama Specie Bank, all of which are treated in this manner, and at the present time on the new Custom House. As the foundations are similar in all these cases, it will be sufficient to describe one of them, and for this purpose I select the Custom House.

This building is 450 ft. by 140 ft. in area, and has normally 7 floors, though the front block has 9, and has in addition a tower 265 ft. high (see Fig. 5).

Drawings will be shown of the raft and the piles (Figs. 6 to 10). The raft takes the form of a continuous slab of reinforced concrete varying in thickness from 16 in. to 24 in. under the tower and stiffened by ribs in both directions, which are generally about 22 ft. apart. These ribs form reinforced concrete beams and normally have a depth of 6 ft., including the bottom slab, but under the tower are increased to 9 ft. The columns rest on the tops of these beams at their intersections.

The most difficult portion in the case of the Custom House is that immediately under the tower. The total load which comes down in four small areas under the four corners of the tower is altogether 6,700 tons, and this load is distributed by the raft over an area of approximately 60 ft. sq. Of this total load 2,240 tons are carried by the direct action of the soil on the raft and 4,460 tons by the 225 concrete piles in this area. It will readily be understood that to transmit these heavy loads over this area requires very considerable strength, and the details of the reinforced concrete beams which will be shown are perhaps of interest.

The main reinforcements are $1\frac{1}{4}$ in. diameter, and the largest beams have 16 such rods in the tension side. The shear strength has to be very carefully considered with beams of this kind, and both bent-up rods and stirrups are used for this purpose.

The piles are of reinforced concrete 50 ft. long, 16 in. square, and the surface is serrated to give additional friction resistance.

One of the difficulties on a soil of this kind is that even after taking all these precautions considerable settlements are experienced. These settlements are not found to be damaging, provided the whole building settles at the same speed and the same amount. To ensure this it is necessary to proportion the carrying capacity of the back of the raft to its particular load, so that no portion shall tend to settle more than any other. This is effected by so distributing the piles as to provide for each section of the raft exactly the additional resistance required over and above what the soil itself will carry. It will be seen that in structures of this kind it is just as dangerous to make one part of the raft too strong as to make another part too weak, because the part that is too strong would fail to settle with the rest and would then cause the structure to break its back.

The safe pressure on the soil allowed by the Shanghai regulations is only 1,600 lbs. (about $\frac{3}{4}$ ton) per sq. ft., and it is, I think, remarkable that with such a soil buildings of this magnitude can be erected at all.

It is usual in the case of large buildings in Shanghai to estimate beforehand what the likely settlement will be and build the structure above

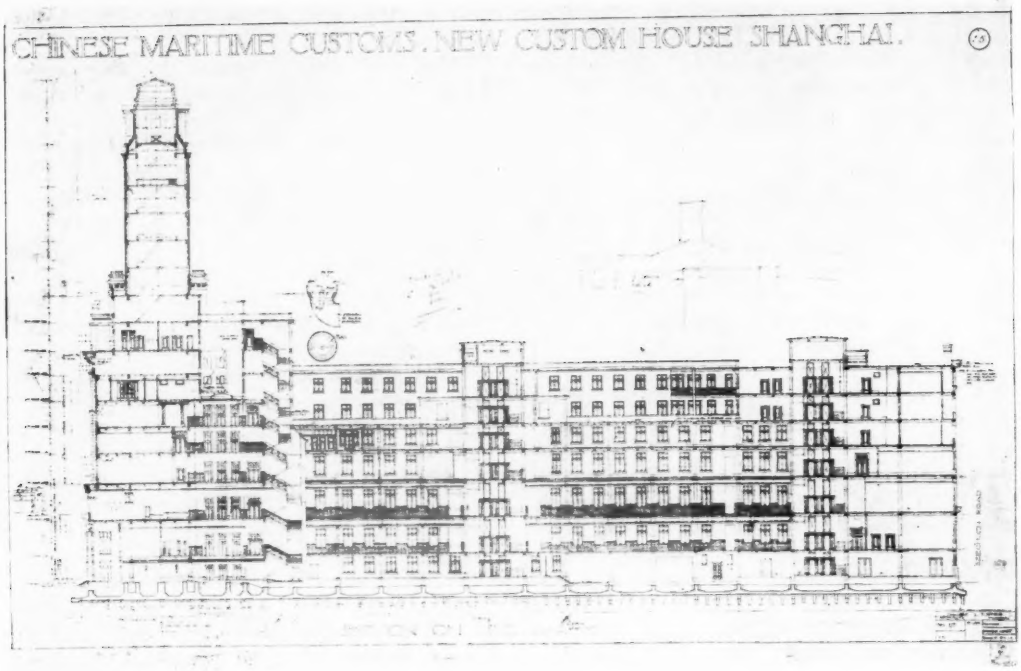


FIG. 5.—NEW CUSTOMS HOUSE, SHANGHAI. (Longitudinal Section)

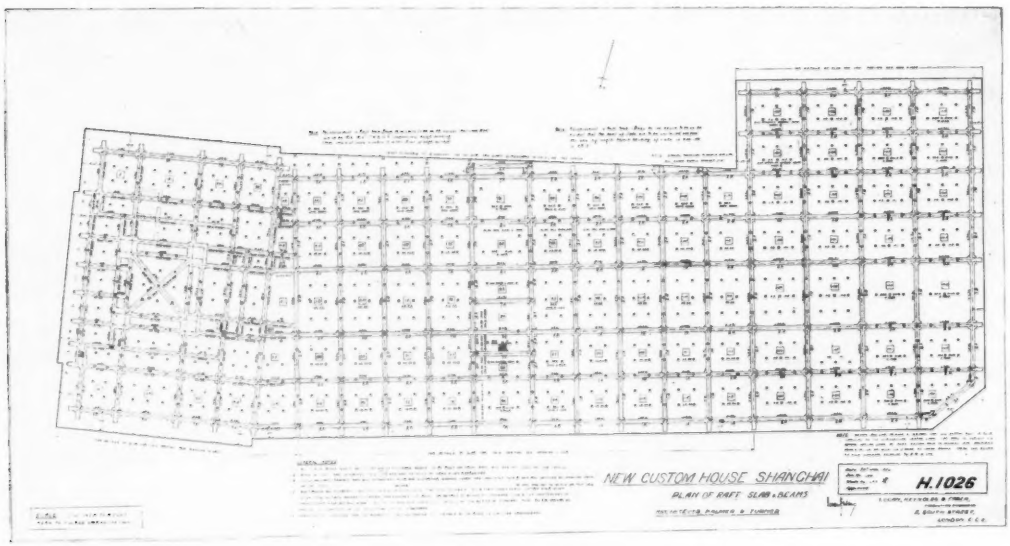


FIG. 6.—NEW CUSTOMS HOUSE, SHANGHAI

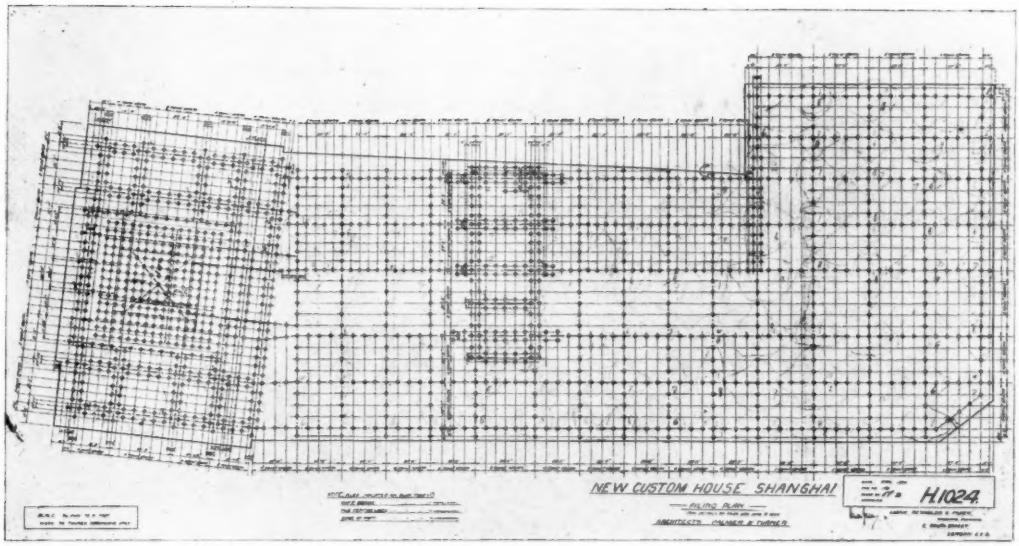

NEW CUSTOM HOUSE SHANGHAI
PILING PLAN
ARCHITECTS PALMER & TURNER
H.1024

FIG. 7

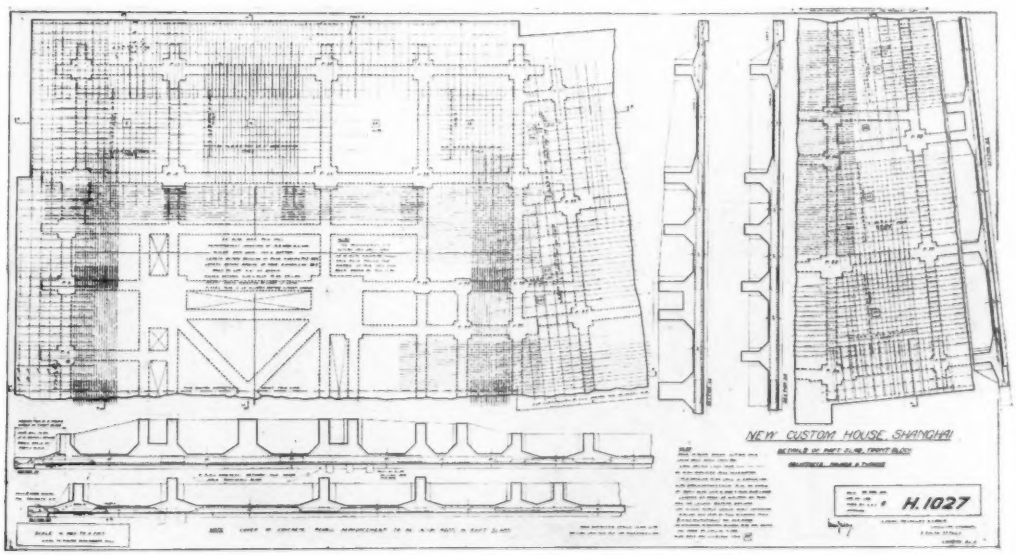

NEW CUSTOM HOUSE SHANGHAI
H.1027

FIG. 8

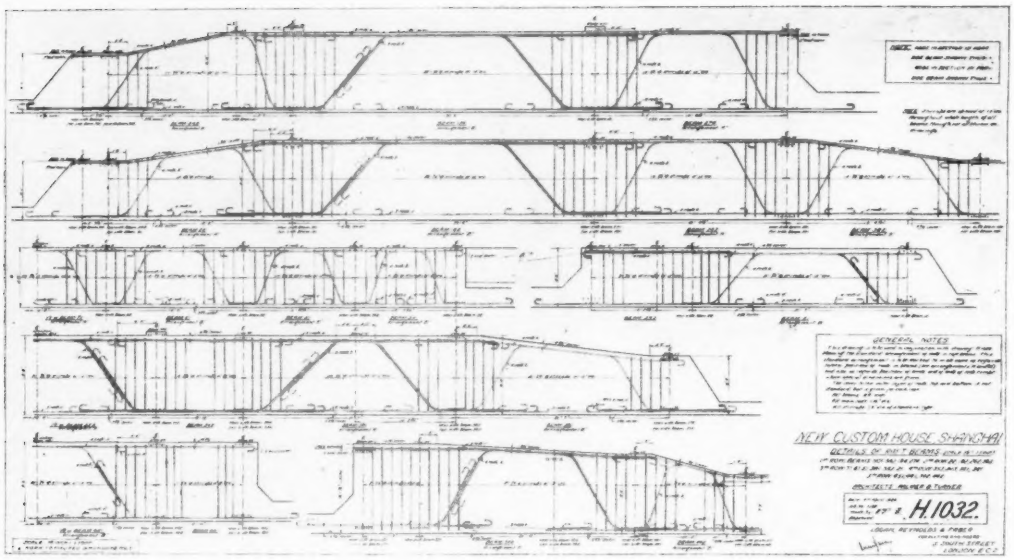

GENERAL NOTES
NEW CUSTOM HOUSE, SHANGHAI
H.1032.

FIG. 9

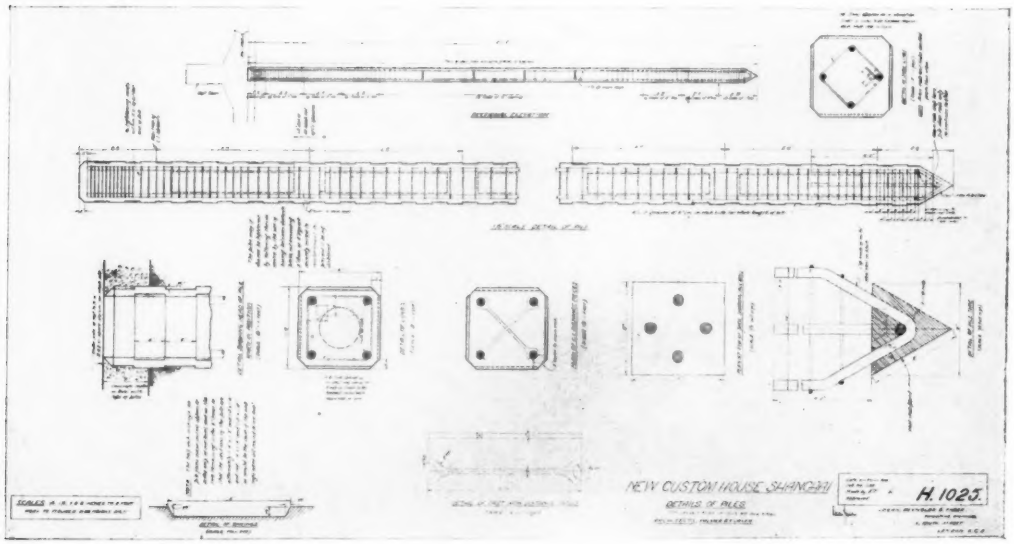

NEW CUSTOM HOUSE, SHANGHAI
DETAILS OF PILES
H. 1025.

FIG. 10

its final level by this amount. In the case of the Hong Kong Bank and the Chartered Bank, the ground floor was made at a level of 12 in. above the position where it was thought likely to come to rest, and temporary steps were erected from the street, which were removed one at a time as settlement proceeded. The actual movement on the Hong Kong Bank up till last summer was approximately 9 in. to 10 in.

the top level with ground level. The portion between the walls is raised up above the ground so as to form the ground floor and actually rests on hard core rolled on to the mud to receive it. In this way the raft also forms the ground floor, and so makes a considerable economy, and deep foundations below water-logged ground were entirely avoided. There has been no settlement, in spite of the fact that heavy engines supplying

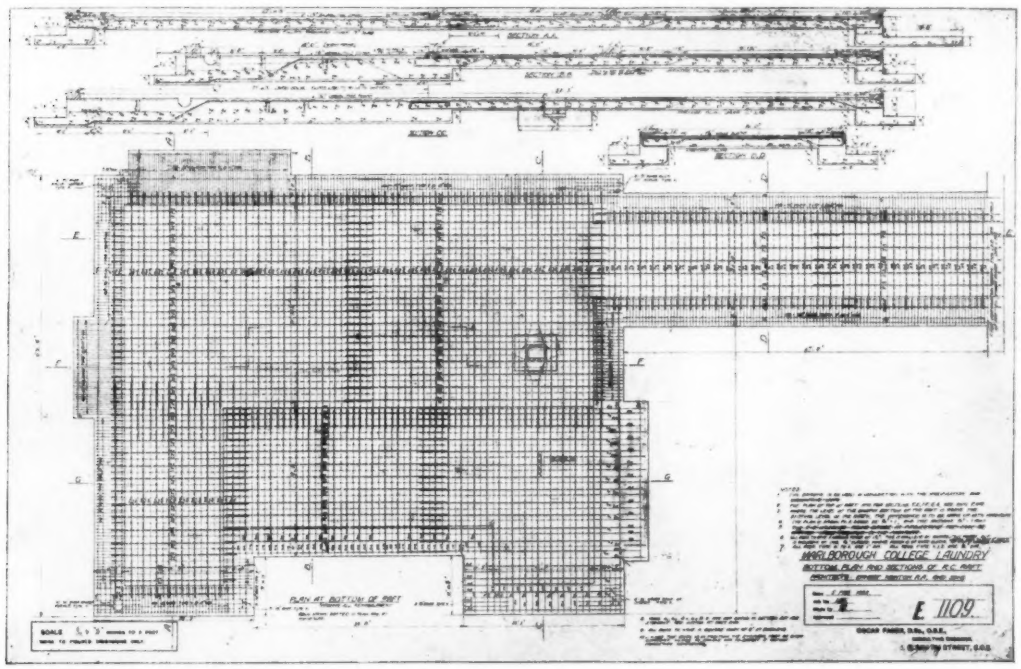


FIG. 11.—REINFORCED CONCRETE RAFT, MARLBOROUGH COLLEGE LAUNDRY

I would like to refer to one or two special examples of small rafts which, in spite of their being small, have special points of interest. One of these is represented by the rafts for the laundry and power house at Marlborough College, for which Messrs. W. G. & H. A. Newton were architects. (See Figs. 11, 12, 13 and 13a.)

This is founded on very soft low-lying soil, and it was desired to keep the ground floor 18 in. above the general level of the ground owing to the risk of floods. A raft foundation was used, the portion near the walls being about 9 in. thick and

both the College and the town with electric light are founded on the raft and produce considerable vibration.

A specially interesting raft was used in the Harrow Music School. This structure, which was some 50 years old, was built on the side of a hill at Harrow on yellow clay, which in Harrow is particularly treacherous. The building was originally built on brick tiers averaging 14 ft. to 16 ft. below ground floor, and spread on concrete piers averaging perhaps 5 ft. square. At the date when I was interested in it, a year or two ago, settle-

ments in the building were so pronounced as to render it dangerous, and the settlements were proceeding. Some repair work had been done a few years previously, but had not stopped the settlement. Calculations of the bearing pressure under the piers showed that these pressures, though only amounting to about $1\frac{2}{3}$ tons per sq. ft., were more than the clay would resist without settlement, in spite of the depth of the piers. Underpinning would have been a very hazardous and expensive operation, and I recommended the construction of a concrete raft only 8 in. thick to be constructed as a basement floor and chased into the existing piers so that no further settlement could take place without taking the raft with it. (See Fig. 14.) This raft had to be constructed at various levels owing to the slope of the ground, and was an inexpensive operation, and I am told that no further settlement has taken place.

The effect of the raft was to reduce the pressure down to only 1,100 lbs. per sq. ft., which practically any soil will resist without settlement.

Leaving rafts now, I would like to say a word in connection with concrete piles. Up till quite recently piles for carrying buildings were practically always of timber. This material has all sorts of advantages, but unfortunately one very serious drawback, viz., that even under favourable circumstances it cannot be relied on for more than 100 years, and where the timber is exposed to both air and water this period may be reduced to 20 years or even less.

It therefore has serious disadvantages in modern building construction, and though I understand timber piles were recently used in a very large and important building in London I cannot imagine that this will be the practice of the future.

The life of reinforced concrete is a subject about which there has been much speculation and difference of opinion, but I think the matter is fairly summed up as follows.

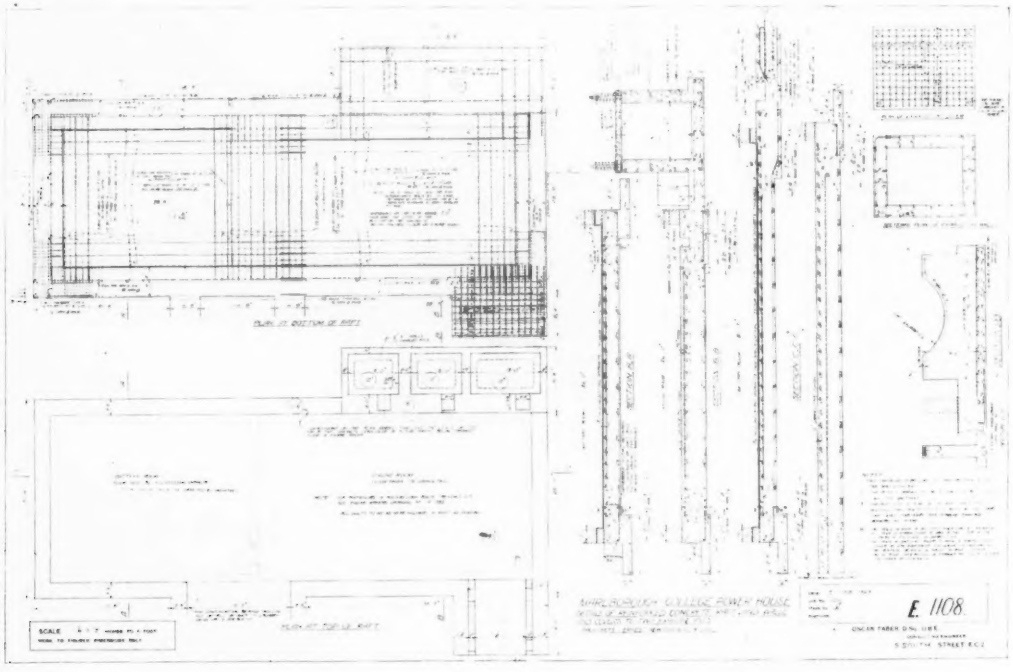


FIG. 12.—REINFORCED CONCRETE RAFT, MARLBOROUGH COLLEGE POWER HOUSE

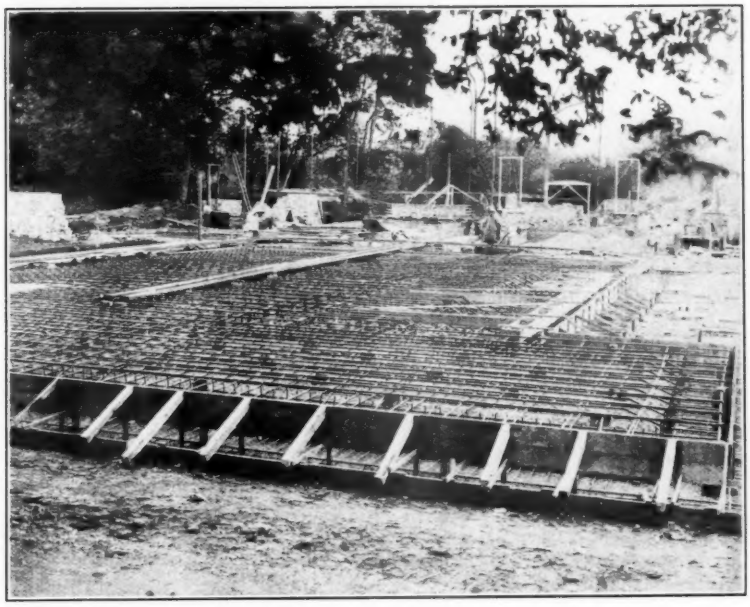


FIG. 13.—MARLBOROUGH COLLEGE POWER HOUSE RAFT
Photo of reinforcement before concreting

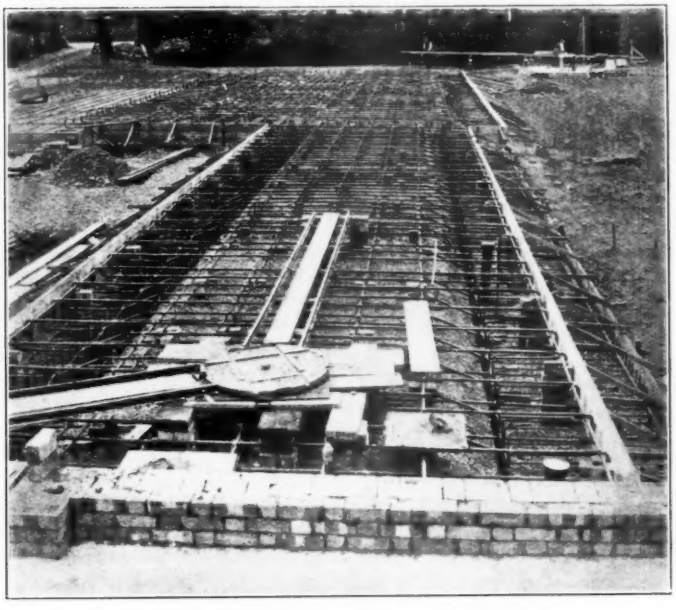


FIG. 12A.—MARLBOROUGH COLLEGE LAUNDRY RAFT
Photo of reinforcement before concreting

We have little actual experience of reinforced concrete of more than 30 years, but such as we have goes to show that with certain reservations it is as good to-day as it was the day it was made. These reservations are as follows :—

(1) Where the cover of concrete is inadequate in thickness or where the concrete has been of faulty materials or gauged with insufficient cement, or where the concrete has been broken away by mechanical injury or was imperfect from the first, has the support of some architects, though it necessarily puts the designer in the uncomfortable position of having to skin the design to the bone or lose the job to a lowerer tenderer. Reinforced concrete is really the worst material for such treatment, because the difference between a design with adequate protection and one without, which may represent perhaps only 5 per cent. in cost, may mean the difference between 20 and 100 years in the life.

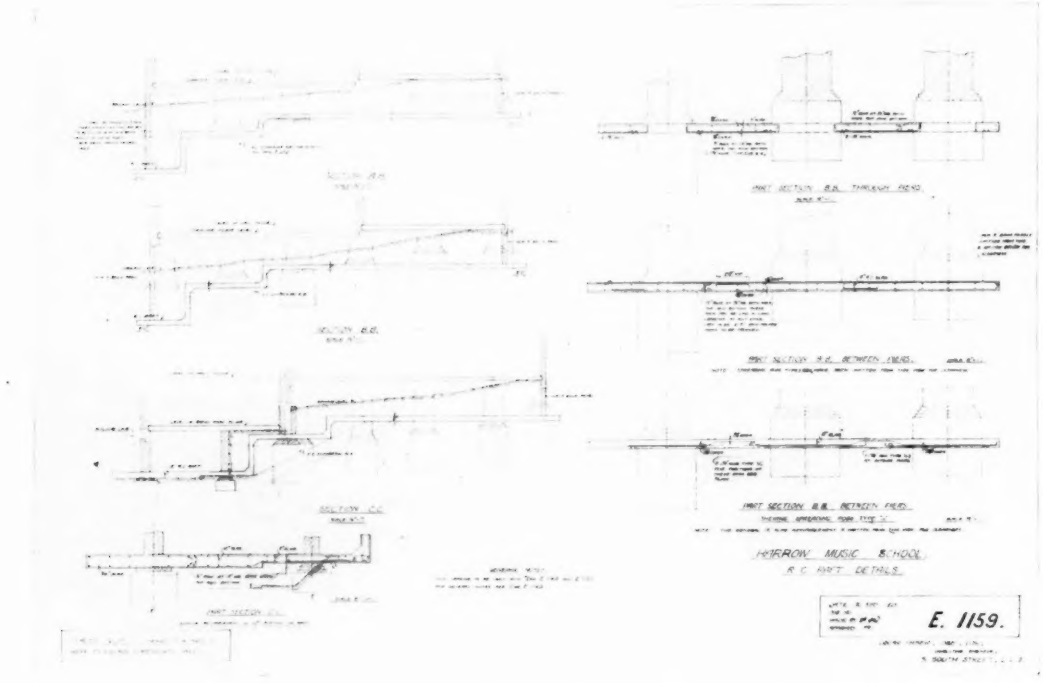


FIG. 14.—HARROW MUSIC SCHOOL. REINFORCED CONCRETE RAFT

owing to carelessness in concreting, corrosion has set up.

(2) Reinforced concrete seems to stand fresh water perfectly, but suffers deterioration in sea-water and water in boggy or peaty land containing organic acids unless special precautions are taken. The use of reinforced concrete has suffered, and will suffer, from the insane system of competitive and commercialised, as opposed to professional, designing which, strangely enough, still

Nevertheless, the writer is quite convinced, both from theoretical considerations and from the evidence of the oldest structures that we have, that where the design and execution are the best of their respective kinds, then reinforced concrete in ordinary situations is the most lasting material which we have, with the possible exception of the best stonework and brickwork, the exclusive use of which is generally impossible in modern secular buildings owing to the excessive space which they demand.

In the case of concrete piles, we have an excellent application of reinforced concrete where it probably has no equal. One of its objections until quite recently was the length of time which it takes to harden sufficiently to stand driving. This disadvantage has recently been practically obviated by the great advances made in the manufacture of cement. Not only has there been a gradual but marked improvement in ordinary cement over the last 20 years, but remarkable advances in the last year or so are still more noteworthy.

While the current British Standard Specification for cement still specifies 200 lbs. per sq. in. as the minimum tensile strength of 3 to 1 briquettes at the age of 7 days, it is now no uncommon thing to get samples of cement giving 350 up to 450 lbs. per sq. in. Early in December I received a sample which on test gave 548 lbs. per sq. in.

The Associated Portland Cement Manufacturers have recently brought out a new rapid hardening Portland cement which I had the opportunity of testing quite recently in which the tensile tests gave

312	lbs.	per	sq.	inch	in 1 day.
516	,,	,,	,,	2	days.
583	,,	,,	,,	3	,,
611	,,	,,	,,	5	,,
688	,,	,,	,,	7	,,

The corresponding crushing stress showed the same advances over ordinary cement. It will be seen that this cement attains a greater strength in one day than the British Standard Specification would require as a minimum in 28 days. Six to 1 concrete made with this same cement gave the following stress in crushing :—

1 day,	1,750	lbs. per	sq. inch.
2 days,	2,910	,,	,,
3 ,,	3,853	,,	,,
5 ,,	4,840	,,	,,
7 ,,	5,360	,,	,,
28 ,,	6,810	,,	,,

The effect of this is to give us the strength in one or two days which we were previously satisfied to get at the end of 28 days, and the effect of this on reinforced concrete work is obvious.

Another recent cement of special quick-hardening properties is the so-called aluminous cement imported from France, in which 6 to 1 concrete has given the following tests :—

2 days,	5,330	lbs. per	sq. inch.
3 ,,	6,030	,,	,,
7 ,,	8,240	,,	,,

These results are slightly higher even than the quick-hardening ferro crete, but the aluminous cement is also considerably more expensive.

Compare these with ordinary concrete where a strength of about 2,000 lb. per sq. inch in 28 days is quite normal and it will be realised what tremendous advance has recently been made. The advantage of this was recently taken by the Author in a small work of considerable interest.

The foundations of Marlborough Hall were found to be settling when the structure was nearing completion and on examination it was found that cracks in the walls were opening and accurate levels indicated that considerable settlement was still taking place, an inch of settlement being recorded in a fortnight.

The ground here is water-logged immediately below the foundations so that underpinning would have presented very great difficulties. It was also considered that to withdraw the water by pumping from the foundations it was desired to underpin would have produced a dangerous situation.

The matter was dealt with by driving trestles consisting of two piles, one of which was driven as near to the foundation as possible and the other about 10 feet away (See Fig. 15). Two 16 by 6 steel joists were then fixed to the tops of the piles, overhanging the nearest one so as to pick up the foundation. The nearer pile of course is then in compression and the outer pile acts as a tie to hold the end of the lever down. These piles ought obviously to be lasting as the safety of the structure would depend on them, and it was not considered that timber would be suitable for this purpose as the top of the timber piles would be alternately exposed to air and water, depending on the level of the river.

Concrete piles were the ideal thing, but it was clear that we could not wait two months for the concrete piles to be made, matured and driven as the settlement in the interval would have endangered the building. Actually the concrete piles were made with the new aluminous cement and were successfully driven when they were two days old. They were driven with a 2-ton monkey with a 3-feet drop to a set of about $\frac{1}{8}$ inch per blow. The steel cantilevers were then bolted down to them by straps and bolts through holes which had been previously cast in the piles to receive them and the joists with their straps and bolts were then cased in concrete to protect them from corrosion.

This has been entirely successful, and no movement has occurred since, and the work was done at a very moderate cost considering the circumstances.

While on the subject of concrete piles it is perhaps interesting to mention that there are in existence about ten formulæ for determining the safe carrying capacity of a pile from the weight of the monkey, its drop and the final set per blow. These formulæ all give greatly differing results and I have known cases where these results have differed as much as from 20 tons to 140 tons. It is clear they are all quite unreliable and indeed they all fail to take into account some of the important factors on which the carrying capacity of the pile depends ; one of these, perhaps the most important one, is the " taking up " as it is called, when the pile is allowed to rest after driving.

The Menin Gate in Ypres for which Sir Reginald Blomfield is the architect has foundations consisting of roughly 25 feet of quicksand with blue clay below. The foundation consists of about 500 ferro-concrete piles 40 feet long extending through the quicksand and roughly 15 feet into blue clay. A 3-ton monkey dropped 3 feet produces on these piles a set of somewhere between $\frac{1}{4}$ to $\frac{3}{8}$ inch per blow.

An interesting test was made on some of these piles by leaving them for a month or so and then applying the same blows to a pile as had produced $\frac{3}{8}$ inch set per blow during driving. The effect of 20 blows on the pile was nil and the pile absolutely refused to drive after a period of rest. This taking up depends very much on the nature of the soil and is accounted for as follows :

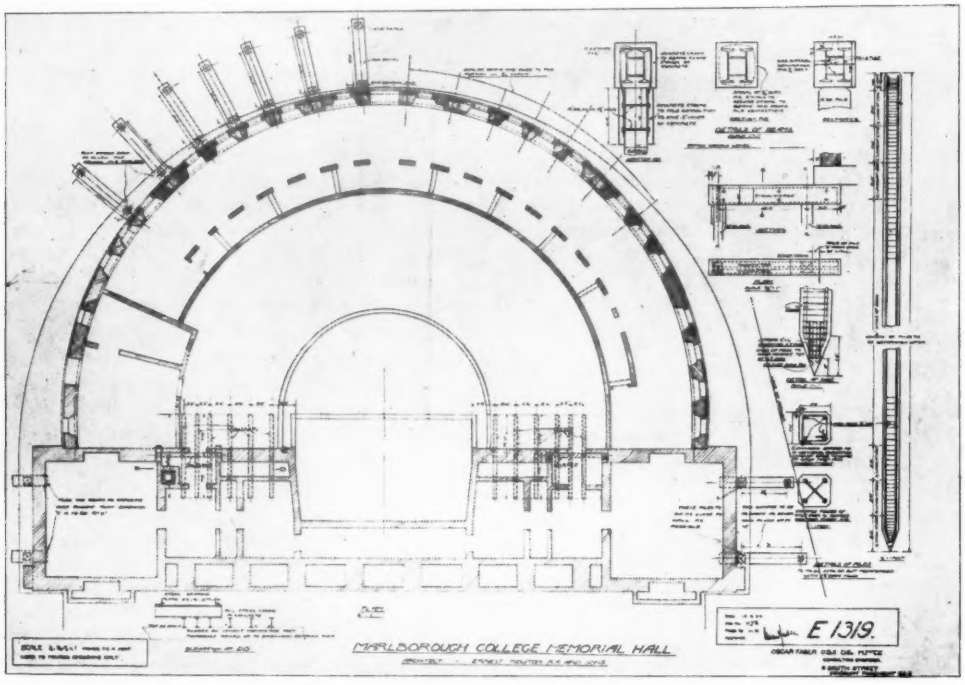


FIG. 15—MARLBOROUGH COLLEGE MEMORIAL HALL

When the pile is first driven the soil immediately surrounding it has its cohesion shattered by the vibration of driving and therefore driving proceeds comparatively easily. After a period of rest the soil is pressed against the pile owing to the hydrostatic pressure existing in the soil and this cohesion is gradually built up again. In other words, the pile sticks to the clay or surrounding earth and this cohesion has to be broken down before further movement of the pile will take place. The whole of this cohesion is available for sup-

porting the pile and is a very large element of the total resistance. This additional cohesion or " take-up " is greatest for blue clay and least for dry sand, and therefore any pile formula which fails to take into account the nature of the material through which the pile is driving can obviously only be misleading.

The writer has found it much better to predetermine the length of a pile and its carrying capacity from a consideration of the skin friction or cohesion between the pile and the soil, which with a little experience can be estimated for various soils with considerable accuracy. Where time allows, an actual loading test of a group of 4 piles is highly desirable on important structures, and is the only reliable criterion of their carrying capacity.

Where it is desired to carry foundations down through a waterlogged soil there are in general three good methods. The first is by using bearing piles as already described.

If the foundation at the bottom consists of clay or other impervious material into which steel piles can be driven sufficiently to make a water-tight joint, then a second good method is to drive sheet steel piles all round the foundation and a few feet into the stiff clay at the bottom, when the excavation can be removed, and concrete placed in the ordinary way.

Of the various sections of piles used, that designed by the British Steel Piling Co., which is shown in Fig. 16, is the best for most purposes.

The locking arrangement gives great security against the piles springing apart during driving; and the long passage in the joint for any water to leak through reduces any leakage to a minimum.

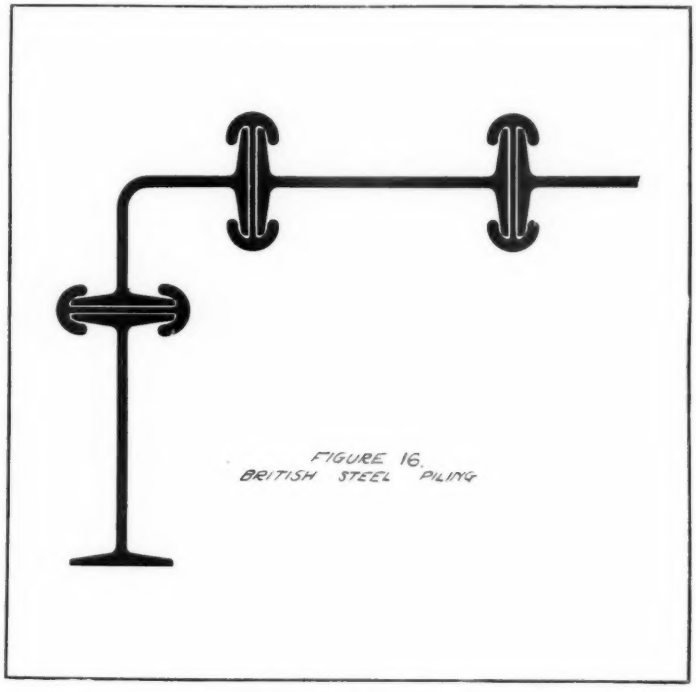
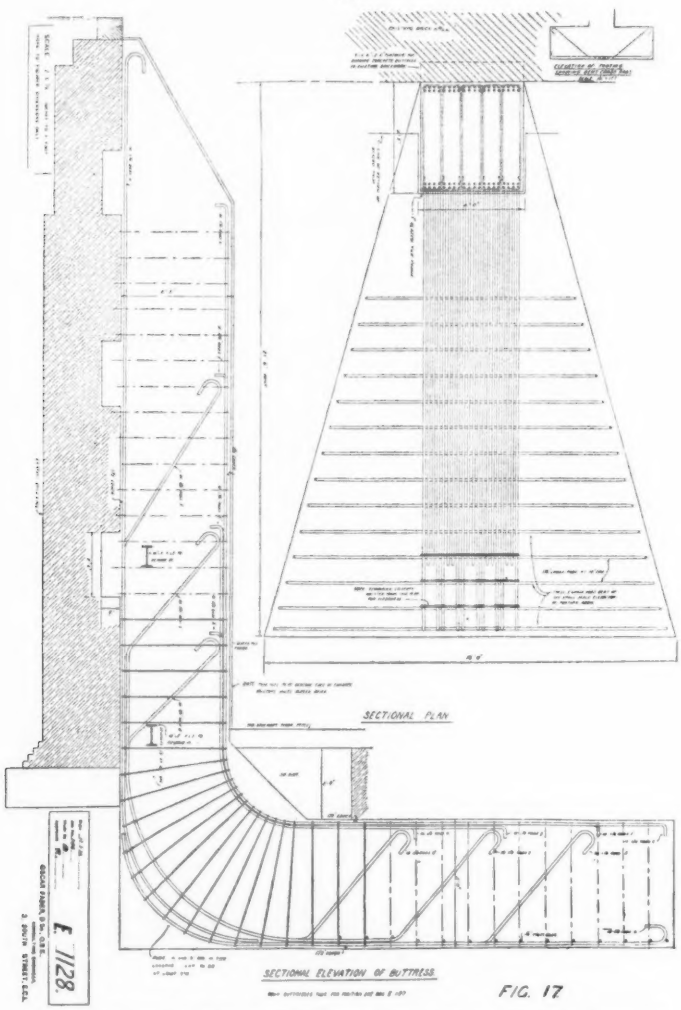


FIGURE 16.
BRITISH STEEL PILING

Such piles are being used successfully for the foundations of Courtaulds' new building in St. Martin's-le-Grand and are proving entirely successful.

Where, however, the foundation is rocky and a water-tight joint cannot be made by sheet piles, then caissons generally provide the best solution. A caisson consists of a box composed either of steel plates or of reinforced concrete, which is

gradually sunk into the ground by weighting it. The caisson has a cutting edge at the bottom and a horizontal diaphragm some 8 feet above the cutting edge. Access to the working chamber below the diaphragm is obtained through tubes extending from the diaphragm to the top and provided with air-locking arrangements. Men are lowered down into the working chamber, from which water is excluded by means of compressed air. The soil is then dug out from under the cutting edge, and sent up to the top in skips through the air-locking tubes. As the caisson sinks additional sections are built on to it on top. When the rock is reached its surface is cleaned up, and concrete is then placed from above so as to completely fill both the working chamber and the space above it.



BRICK RETAINING WALL SUPPORTED BY REINFORCED CONCRETE BUTTRESS

The Federal Reserve Bank in New York had its outer walls constructed of reinforced concrete caissons in this manner, the caissons being 30 feet long and 8 feet wide.

A special feature in connection with this work is that the caissons were lowered down 100 feet on to rock, although the site is bounded by narrow streets with tall and heavy buildings on the other side, which were not disturbed or underpinned during these operations.

In conclusion I would like to refer briefly to a special application of reinforced concrete to the strengthening of a brick retaining wall, a drawing of which will be shown.

A large site had been excavated to a depth of 30 feet approximately, and the surrounding earth, together with the buildings upon it, was being retained by means of a brick wall 3 feet in thickness. At the time when the author was called in the wall was showing signs of overturning owing to the pressure of earth behind it. It was immediately shored to render it safe, and subsequently has been strengthened in a manner which will be described.

In connection with this work the Author formed his opinion, after an examination of the soil, of the pressure on the back of the wall, but desired, for several reasons, to have a check of these pressures if possible, and it was found that the trench for the retaining wall was strutted across by means of horizontal timber struts 7 feet apart in both directions, the sectional area of the struts varying between 7 inches square and 8 inches square.

This, of course, was on those portions of the wall where the dumpling had not yet been removed, and where the struts were still resisting the full horizontal pressure corresponding to their particular depth. It was noticed that the struts had indented themselves to a considerable distance into the horizontal timber walings, and this suggested the means of checking the earth pressure. A particular strut half-way down the wall was found to be $7\frac{1}{2}$ inches square, and the indention to the horizontal timber, which amounted to about $\frac{3}{8}$ inch, was measured. A similar strut and a similar piece of waling were then tested in a testing machine, and it was found that a pressure of about 28,000 lb. was required to produce the same indention of the strut into the waling.

Having regard to the fact that these struts were 7 feet apart in both directions, it was possible to check back and calculate that the earth pressure at this depth must be of the order of $28{,}000 \div 49 = 570$ lb. per square foot. The calculated pressure at that depth by the author's assumed pressure curve came to 630 lb. per square foot, which was considered to be in close agreement.

This was considered of sufficient interest by the author to be recorded, because it is not often that we have opportunities of checking the pressures for which retaining walls need to be designed.

As a matter of interest Fig. 17 is added, showing how the walls were actually strengthened. A reinforced concrete buttress of rather peculiar design was constructed against the inside of the wall at intervals and efficiently bonded to the existing brick walls. Its effect is to increase the leverage of the weight of the wall from about 1 foot to about 15 feet, and is therefore, obviously, extremely effective in supporting the wall against any tentency to overturn.

It will be readily appreciated how extremely economical this method of strengthening the wall was as compared, for example, with the construction of a continuous reinforced concrete wall inside the brick one.

From the point of view of obstruction, the arrangement adopted also proved to be peculiarly convenient, as these buttresses could be placed in certain recesses in the brick wall.

It will be noticed that the buttresses are heavily reinforced, as might be expected, as the pressure on a considerable width of wall was being resisted by a buttress only 4 feet wide, and it was necessary to reduce the dimensions to an absolute minimum with a view to causing as little obstruction as possible.

Actually the composite wall consisting of the ferro-concrete buttress with the brick wall between the buttress is no more expensive than the most economical type of brick or reinforced concrete retaining wall which would be safe to resist the actual pressures experienced.

(The Discussion which followed Dr. Faber's Paper will be published in the next issue of the Journal.)

St. Paul's Cathedral

BY WILLIAM DUNN [*F.*]

LATE CONSULTING ENGINEER FOR REINFORCED CONCRETE CONSTRUCTION TO H.M. OFFICE OF WORKS

THE morning papers of 31 December 1924 published a report made by the Commission appointed by the Dean and Chapter to advise upon the condition of the Dome and its supports. I have given a considerable amount of attention and study to St. Paul's Cathedral, and I find myself so much at variance with the conclusions of the Commission that I would like to put my own opinions forward for what they are worth.

Anxiety on the part of those responsible for St. Paul's Cathedral is no new thing. This anxiety of late years has centred round the supports of the Dome—the legs of the piers—which began to fail under the great pressure before the Dome was finished. Repairs were begun to these in Wren's lifetime, and were continued by Flitcroft and Robert Milne during the eighteenth century.

Facing stones were cracked, and what is called "Veneering" was resorted to—the face of cracked stones was cut back for a few inches and a new stone facing put to cover up the failure of the stone behind.

Subsequent surveyors of St. Paul's (Prof. Cockerell, Mr. Penrose and Mr. Somers Clarke) were aware that the piers were in an unsound condition, but nothing was done by them in the way of actual repair, though Mr. Somers Clarke carried out considerable repairs to other parts of the structure.

It was not until Mr. Mervyn Macartney's appointment as successor in the surveyorship to Mr. Somers Clarke in 1906 that the matter was again seriously taken up. He became alarmed at the condition of the piers, and at his suggestion a Commission of Enquiry, consisting of Sir Aston Webb, Messrs. Collcutt, Belcher and Macartney —all architects—was called together in 1907. Their report is an interesting document, showing that the Commission explored various possible causes of failure, but kept off the very obvious one of the inherent weakness of the piers under the Dome.

Let us quote a few sentences from their report :—

"The topmost stone of the dome was laid in 1710, the date usually taken as marking the completion of the building, though much work was still going on within and without, and much was left undone.

"But before this date, in December 1709, an entry in the Cathedral pay-book records 'work done in repairing flaws occasioned by the pressure, making good such stones as could be left remaining with lead and plaster, being the eight Leggs of the Dome and in the inside of the East.W.N., and South cross being above 1,500 foot in perifery.' This repairing continues in the two months following. Similar entries are found during the first six months of 1716, where one of the legs of the Dome is mentioned as having been repaired with '42 tun of Portland stone,' and again in 1772, when repairs to the South-East leg of the Dome are specified. One of Wren's original drawings in the Cathedral Library is a quarter plan of the Dome area on which the great south-east pier is noted as 'the peer which has been repaired' and the work was done by Edward Strong, who succeeded his father and uncle as Clerk of Works."

This Commission devotes most of its report to consideration of the settlement of the ground from various causes, and seems to consider all the trouble had arisen from that settlement. They came to the conclusion "that the fractures then found were of long standing, and did not give ground for special anxiety." "We have seen no evidence of crushing as a result of the various settlements."

They, however, had in another paragraph of their report noted "that the settlements of the fabric which occurred during the building of the church, and particularly the dome, have continued in some degree to the present day."

This Commission concluded that "there is no immediate necessity for any extensive remedial measures to be undertaken."

Their report finishes with a eulogium on Sir Christopher Wren :—

"In conclusion we must pay a tribute to the wonderful constructive ability of Sir Christopher Wren. That a building of the magnitude and weight of St. Paul's should have survived the altered conditions of the subsoil without more serious damage is an evidence of his masterly skill and ingenuity, for he provided against every danger known to his time."

Nothing is said—possibly because they knew nothing of the interior of the piers, or because they were misled by a statement in the *Parentalia*—of any original weak construction in the legs of the Dome. Here is that statement, quoted in the Commission's report :—

"The huge and massive pillars of the Dome (which is one hundred and eight feet in diameter within the walls) brought to the same height, *the work being totally wrought of large Portland stone*."

As we shall see, this was a very misleading statement.

After this report was received, nothing was done until Sir Francis Fox, an eminent engineer who had, one might say, specialised in cathedral repairs, was introduced by Canon Alexander. Sir Francis took an exceedingly grave view of the condition of things, and accordingly a second Commission was formed in 1913, consisting of Sir Francis himself and Messrs. Darwen, Davison, Caröe and Macartney; the last two being architects and the others engineers.

This Commission failed to agree and presented a majority and a minority report. The former, signed by Sir Francis Fox, Macartney and Davison, found that "the piers of the dome were in a more or less unsound condition so that some of the stones are overweighted and have cracked." They considered "the state of affairs too serious to allow of delay" and recommended the grouting up of the main piers and masonry generally and as a measure of safety, the shoring up of the arches of the Dome, and the strutting of the piers. The minority report, signed by Caröe and Darwen, contradicted many

of the statements made by the majority; these last named gentlemen complained that the necessary time and facilities had not been given for a careful examination of the structure and that a properly considered recommendation could not be given.

After the receipt of these two reports, the Archbishop of Canterbury and others requested Messrs. Carõe and Macartney to undertake a more thorough investigation. After they had done so, Mr. Carõe took a more serious view of things and agreed with Mr. Macartney upon certain works of repair which the surveyor subsequently carried out to the two South transept piers.

Meanwhile certain grouting experiments had been made on one of the Crypt piers, but these were not altogether satisfactory, the cement becoming air-locked and refusing to go in.

Sir Francis Fox, finding that his recommendations were not being carried out, and no doubt moved thereto by a high sense of public duty, wrote to the King's Private Secretary in 1921 stating that the building was unsafe; and this resulted in the calling together of yet another—the third—Commission in 1921. This consisted of Sir Aston Webb, an architect, and three engineers, Messrs. Humphreys, Mott and Trench, eminent in their profession as municipal, tube and other railway engineers, Mr. Macartney having also a seat on the Board, as the phrase goes.

The question at issue being a scientific and not an artistic matter, no one will find fault with those who are not overborne by great names, but in the true scientific spirit question all things. Without that spirit, we should have made no advance on the classical mechanics of Newton or the geometry of Euclid. Even in this controversy as to St. Paul's there has been too much deference paid to Sir Christopher Wren himself. Great architect and great scientist as he was, he was without the accumulated experience of the last two centuries, without our instruments for testing materials, or our long records; and we can no more blame him for not being abreast of modern methods than we can blame his great contemporary, Newton, for not anticipating Einstein. All kinds of secondary causes were suggested and debated before we could admit that Wren—the glory of English architecture—could have built his piers which carry the Dome in a way which the speculating builder of our own times would shrink from. Yet such is the case. The drainage of the subsoil, the construction of sewers, the settlements of the building, the vibration of motor traffic, and the action of the sun, all possibly and probably contributing to the result, were discussed before the main and sufficient cause was even whispered: that the piers were too weak to bear the load upon them.

The Cathedral accounts, as we have shown, indicate this clearly enough. But through the intervening years all concerned, down to those Commissions, seemed under the spell of Wren's name, and to have hoped against hope that because the work had stood so long a little patching up would enable it to stand for as long again—as if a little patching up would enable us to prolong the life of a man of seventy to one hundred and forty years.

We know beyond any doubt that these piers are *not* "*totally wrought of large Portland stone*"; on the contrary the square Portland stone we see is but a thin badly built shell enclosing a core, or hearting, of stone debris of various kinds—Portland, Kentish rag, purbeck marble, indurated chalk, etc., much of which was got from the ruins of the older church destroyed in the Great Fire—and all embedded in lime mortar.

Sir Francis Fox, in his "Reminiscences" (if the present writer's memory is correct) compared the piers to a box in which a child has thrown his toys in disorder. This hearting, in fact, is like a very badly made concrete in which the aggregate of stone is not graded into the proper sizes, and the weakest cementing matter has been used. Even the projecting foundations or footings are of this same weak, uncoursed rubble or concrete, with a thin deceptive casing of stone. When the first Commission says in its report of 1907 that they "found the footings were formed of three twelve-inch courses of stone slabs" they were sadly mistaken.

We have no tests of what this material—this hearting which forms the main body of the piers—could safely bear, for the simple reason that no one would to-day propose such a method of construction for any weight-carrying structure.

Examinations of this hearting with its lime mortar in sometimes excessive thickness makes one doubt if the proper safe load should exceed five tons per square foot, such as we would put on moderately well-built brick piers. Certainly it would not be as great as the maximum load permitted by law on blue bricks in cement mortar, which is 12 tons per sq. ft.

Yet these piers at the level of the nave floor have to sustain an average load over their whole sectional area of more than 15 tons per sq. ft. This is the load due to the weights of the superstructure alone—accurately determined by Mr. Drower in 1914—and is on the most favourable assumption that it is uniformly distributed over all the area of the piers. As we shall see, the actual intensity of the loading very greatly exceeds this figure, which takes no account of the effect of wind, or of the unequal distribution of the loading.

We must remember that Sir Christopher Wren had very little experience in building when he was entrusted with this great work, and that the mediæval custom of building piers was to fill in behind the stone facing with uncoursed rubble. It would also seem, both from his drawings still extant and from the work itself, that the final dimensions and arrangements of the dome were not absolutely fixed before the work was started.

Now this core or hearting being so weak, it was also much more easily compressed by a load than the Portland stone casing, which varies in thickness from something less than a foot upwards. It follows that a much greater intensity of load—a much greater load per square foot—is taken by the less compressible stone.

Mr. Mervyn Macartney has for the first time shown us by a model and by drawings the extraordinarily intricate construction employed by Wren in the dome, the drum, and piers supporting it. Until these were prepared it was almost impossible for anyone—however skilled—to understand the relation of the parts or the various devices

employed to distibute the loading on the piers and arches. As it is, this is such that it passes the skill of man to determine the exact distribution of the loads. Structures in steel with a few redundant members are simple problems compared to what this presents.

Fortunately we are not left to calculation entirely to find what is the intensity of stress in the most important parts ; nor is it necessary here to discuss the exact intensity of the stresses.

It is quite sufficient to observe in the work itself, that these stresses are too much for the material and construction. The hearting of this lime concrete has been split up by cracks, chiefly vertical, and the stone facing or shell has been broken in many places ; the stones cracking and large parts spalling off. This, be it remembered, is not altogether a new thing, only occurring after the building of deep sewers or the advent of motor traffic. It began as soon as the dome was up, and that it is still going on, gradually failing, is shown by the fractures of the stone casing, which fractures are in some cases clean and quite new.

It needs no intricacy of abstruse calculations, no eminence in the profession of engineering, to draw the plain deduction, that the piers are too weak.

Now, efforts have been directed to strengthen the piers by the use of the grouting machine—a machine which forces liquid cement into the cracks, and in suitable cases has been successful in so strengthening old walls and pillars that they last for years afterwards.

Unfortunately, experiments with the piers of St. Paul's in that manner have not been successful. Owing to the quantity of lime mortar, plaster of Paris, etc., soluble in water, it is not possible to drench the cracks thoroughly before the injection of cement grout, which drenching is, if not an essential, at least a very desirable, preliminary operation. Then the condition of the piers is such that it is not possible to use any great pressure to force in this grout. In the crypt, too great a pressure was used, with the result that a part of the stone casing was displaced, so that the grouting had to be stopped and the pressure reduced. An excess of pressure in the grouting applied to the main piers above the nave floors, where the failures are so evident, might easily result in an appalling disaster. So the pressure to be used must be kept sufficiently low. Under this last Commission the process of grouting was applied to one of the piers under the dome ; no new thing, as it was being carried out by the surveyor when the Commission was formed three years ago.

But what was the result ? The proper course would be to cut open the pier, and to ascertain how far the grout had penetrated. We are not told in the report if this was done. If the cement was not found close to the surface, is it likely that it would be found in the middle at a distance of five feet back ?

But suppose that the cement grout has penetrated everywhere and filled up all cracks—a large supposition. What then ? We have still a pier with a hearting of irregular stone in lime mortar, split up into irregular large and small parts by cracks filled up with cement grout. Unless the stone casing is taking all the load, the horizontal cracks must be small ; the main cracks being vertical and splitting up the piers into separate columns, the cement in these can have little adhesion to the lime and stone faces. It is therefore difficult to see how the grout can alter the strength of the hearting ; to the present writer it seems impossible.

Let us now suppose—yet another large supposition—that the hearting *is* strengthened very materially. How will this affect the stone casing, which shows the overstress in it by breaking and spalling ? It could only do so by being put under such a pressure as to increase its length, just as a screw-jack relieves pressure on supports when the jack is screwed up. But it is evident that this pressure cannot be applied, and the dangerous stress in the casing must remain.

It is suggested that after the grouting is finished the broken stones should be cut out and replaced by sound stones. When a broken stone is cut out, there is inevitably an increased load on the remaining stones. When the new stone is put in, it is not put in under the pressure which broke the stone it replaces, so that for every stone we replace we get, not a less, but a greater pressure in the remaining part of the casing.

It is no new thing to have buildings come down after centuries of existence. The towers of Chichester and Seville, the Campanile at Venice, were not new buildings, and all evidence points to an increasing failure here. Have we not Sir Francis Fox's opinion as to the danger, and Sir Aston Webb's in an interview given to an evening paper lately ?

The writer believes any such remedies as grouting and replacing stones are quite inadequate—palliatives at best—and can only give a very dangerous and unwarranted confidence. To him it seems that the piers should be rebuilt with proper material capable of carrying the load ; should be in fact reconstructed as described in the *Parentalia*, " the work being totally wrought of large Portland stone." It would, unfortunately, be a difficult and delicate operation, but if it is beyond the skill of our constructors, be they architects, engineers, or builders, it would appear that we must either face the entire reconstruction of the dome and the piers, or wait until the whole collapses.

The third Commission report contemplates an expenditure of some £120,000 to £140,000 in the fond belief that by grouting and replacing broken stone facing, the piers may have a new lease of life. They leave to others the real task which will have to be faced. To my mind it seems a waste of money in the first place, and a serious danger in the second, to follow this policy. Better spend the money on shoring and centering the arches as recommended by the Second Commission ; if this was necessary then it is more so now.

The Wren Society*

THE SOCIETY'S FIRST ANNUAL PUBLICATION

BY SIR REGINALD BLOMFIELD, R.A.

THE first volume of the Wren Society, edited by Messrs. Bolton and Hendry, deals with Wren's drawings in the All Souls' Library, or rather with a small selection of them, including Wren's designs for St. Paul's, made before the fire, the accepted "Warrant" design, and studies and drawings of St. Paul's made during execution. The volume is admirable in form, the reproductions are excellent, except those of the pencil drawings, and the brief introductory note is scholarly and reticent, almost too reticent, for the volume leaves us much where we were in regard to our knowledge of Wren. Few of the drawings are in the All Souls' collection signed by Wren, and those that are, being geometrical drawings, give one little idea of Wren's actual capacity as a draughtsman. The section of the pre-fire design, signed by Wren, 1666, is well drawn, though the detail is commonplace, and indeed is an inaccurate recollection of what Wren had seen in France the year before. The draughtsmanship of the model design (section) made in 1673 is feeble, though the design itself is an immeasurable advance on the 1666 design. There is no evidence to show that the beautiful drawing of a section of St. Peter's at Rome, and of the Duomo, Florence, or any of the free-hand designs, were made by Wren; and my own impression, formed after a careful examination of the All Souls' drawings some twenty-five years ago, was that, in fact, Wren was not a fine draughtsman, as Inigo Jones and the greater Italians were, and that many of these drawings are not by Wren at all, though they were probably made for him. The bent of Wren's genius lay towards the constructional side of architecture, and he probably left his details to the excellent trade craft of his time. Charming as the results often were, they show little individuality beyond that of the period, and I would suggest to the editors that a comparative study of the drawings, with reference to drawings actually signed by Wren, would throw a useful light on Wren's development as an artist.

The other problem that still remains unsolved is, how is it that Wren, who could conceive and carry through the magnificent building of St. Paul's as we have it, could have produced, first, the hopeless design for the completion of old St. Paul's (1666), then the fine "model" design in 1673, then the extraordinary "Warrant" design, and should finally have turned his back on the lot and worked his way through to the design as it is? Still further, one would like to know how Wren was able to shake himself free of the "Warrant" design, which had been formally sanctioned as "very artificiall, proper and usefull." The "model" design is a mature design, far abler than the rather similar plan of J. H. Mansart's Church of the Invalides, begun in 1680; and yet Wren allowed himself to put forward the "Warrant" design. Possibly he was overpowered by the clergy, who, with some reason, found the plan impracticable; but this would not explain the dome and telescope steeple of the "Warrant" design, which could never have been built as Wren designed it. It may have been suggested by a noble patron, but the probable explanation is that, in spite of his immense ability, Wren, who had only taken up architecture some ten years before, did not yet quite know where he was. His active, fertile brain was still feeling its way, still trying to form some manner of his own. He had not yet reached that assured mastery of his art which a few more years of actual practice was to give him. Fortunately, St. Paul's was long in building, and the delay gave Wren that breathing space that he wanted.

The various studies made during the execution of the work are of the greatest interest, because they show how Wren gradually developed his design from tentative beginnings, by constant self-criticism and experiment; and there can be little reason to doubt that the Cathedral as we now have it is very much better than anything shown in the drawings. It is a proof, if it were needed, that the personal and individual touch of the architect is as essential in the art of building as that of the painter or the sculptor in the arts of painting and of sculpture.

The editors refer to another very important source on which they propose to draw for further material in regard to St. Paul's. They might also allow themselves a more liberal text in exegetical criticism. Elmes' catalogue and remarks want careful revision, and the most eloquent panegyric is useless in the absence of facts. The best service that can be rendered to the greatest of English architects is to ascertain the facts of his career, and place them in their right relationship without fear or favour.

* *The Wren Society*: Vol. I. Oxford University Press, 1924.

Reviews

CONTEMPORARY JOURNALS.

AMERICA.

Architecture, November 1924. There is much that is of interest in this sumptious American journal. The article by Mr. Folger Johnson on "Architectural Glimpses in Old Dalmatia" is illustrated by excellent photographs, which show the variety and interest of the work in the Eastern Adriatic. Of a very different type is the account, with photographs and plans, of the Chicago Temple Building. This, it is claimed, is "the embodiment of new thought in modern church architecture, a combination of office and church building." Externally it is a building of the usual sky-scraper type of about twenty storeys above the ground floor, which is devoted to shop fronts; but the whole is surmounted by an elaborate Gothic spire. On the ground floor behind the shops the space is devoted to a large auditorium lavishly decorated in a free Perpendicular manner, and the vestibule and lobby have also an ecclesiastical character. The upper part of the building is intended for use as offices. A further section of the journal is devoted to the Congressional Country Club, Washington, D.C.

The Architectural Forum. November 1924. Apartment Hotel Reference Number. This issue, which is well illustrated, deals with every aspect, economic, constructional, mechanical and decorative, of the modern apartment hotel. These hotels, which may be termed super-service flats, are extremely luxurious and show many of the latest labour-saving devices.

December issue. A good example of the American use of the Italian Villa style is to be seen in the illustrations of the New Arrowhead Inn, a restaurant de luxe recently completed just outside New York. In complete contrast to the simplicity and informality of this building is that described in the following article, dealing with the great Roosevelt Hotel, by Geo. B. Post and Sons. This great block, containing some 1,100 rooms, is the first large new York hotel built since the Zoning Law, which necessitated considerable setbacks in the upper part. The journal also includes several illustrations of American domestic work, and a series of Renaissance doorways, chiefly from Genoa.

The Architect. December 1924. This magazine contains many beautiful examples of domestic work. Among the larger buildings illustrated are the Federal Bank Building at Cleveland, showing a strong Florentine influence; and the American Radiator Building, New York, with its interesting and on the whole successful attempt to bring romance into the modern sky-scraper.

FRANCE.

L'Architecture. 25 November 1924. The two most prominent articles in this number are an account by A. Louvet of the International Congress on Architectural Education, held in London in the summer, and the speech of Paul Léon, directeur des Beaux Arts, made at the Congress. There is also an illustrated account of a villa at St. Adrien, near Rouen, a picturesque little building of brick and half-timber work, showing considerable ingenuity in planning.

Issue of 10 December. The greater part of this number is devoted to an article on the seventeenth Autumn Salon. The majority of the illustrations are of interior decorative work, but there are also drawings of a proposed National Academy of Fine Arts at Amsterdam, and of various smaller buildings. A most exhaustive study, by M. Pillet, of the temple of Ammon at Karnak should prove of considerable interest to archæologists.

L'Architecture Vivante. This interesting quarterly publication, which is now starting its second year, contains a collection of magnificent plates showing notable modern buildings, mainly European. The current number gives photographs, with details, of work in Paris and Amsterdam, and of a proposed sky-scraper for the *Chicago Tribune*.

SPAIN.

Arquitectura Española. This quarterly magazine is arranged in parallel columns of English and Spanish, and is published with the special intention of interesting English-speaking peoples in Spanish architecture. The most important article is on decorative art in Toledo, that curious town where the East does indeed meet the West, but there are several plates of contemporary competition work showing the high quality of Spanish draughtsmanship.

GERMAN.

Wasmuth's Monats Hefte fur Baukunst. No. 556. 1924. Considerable space is devoted to an illustrated article on alterations and additions to existing buildings in Berlin, but a further and possibly more interesting section is given up to engineering work. The illustrations of the Rheinische Metallwaren-und-Maschinenfabrik at Düsseldorf-Derendorf are particularly interesting.

M. Dickens Whinney.

A HUNDRED YEARS OF PORTLAND CEMENT, 1824-1924. *By A. C. Davis.* [*Concrete Publications, Ltd.*]

The History of the Portland Cement Industry in all its varied phases, besides the interest which directly attaches to the development of one of the most important of the many complicated ingredients of modern buildings, serves as a fairly accurate index to the change that has come over building methods in recent times. The Scientist, and particularly the Chemist, have come to play an important part in the preparation and testing of modern materials; and this comparatively recent development is nowhere better seen than in the growth of the Cement Industry. The volume now presented to the public seems therefore to be in no way out of place or uncalled for—setting forth, as it does, both the historical and scientific sides of the story and comparing the standards and regulations in force in different countries to control the properties of the material supplied to the consumer.

The aim has evidently been to produce a complete treatise on the subject of Portland Cement which is probably at the height of its development, and a large measure of success has certainly been attained. The impression produced, however, in places is that the book has been written in somewhat piecemeal fashion, and the subsequent fusion of the component parts seems hardly sufficiently performed. A little fuller treatment of the subject of cement testing with illustrations of the apparatus employed might have added to the interest and value of the work; but, generally speaking, there is not much ground for adverse criticism of the book, which is, moreover, clearly printed and tastefully produced.

John H. Markham [*F.*].

The Late Sir William Emerson, Past President

BY H. D. SEARLES-WOOD [*F.*].

Sir William Emerson, who died on 26 December, was one of the great mid-Victorian architects who did so much to establish the position of the Royal Institute of British Architects in the nineteenth century. He had a distinguished career in India and in England, and his dignified presence gave great distinction to the various offices he held in the Institute.

Sir William Emerson was born in 1843 at Whetstone, Middlesex ; he was a pupil of William Burges, A.R.A., and was educated at King's College. He went to India in 1864, when he was twenty-one years of age, and built several churches, the Bombay markets, and several other buildings. On his return to England he designed for the Government of India the Allahabad University, which was carried out by the Royal Engineers. He also designed the cathedral for the Lucknow Diocese and the Bhownugger Hospital, and designed a large palace for the late Maharajah of Bhownugger and the Victoria Memorial for India in Calcutta. In England he was architect of St. Mary's Church, Brighton, and Hamilton House, Victoria Embankment. His design was placed first in the competition for Liverpool Cathedral.

Sir William Emerson was elected Associate of the Royal Institute of British Architects in 1866 and Fellow in 1873. He was Hon. Secretary from 1893-1899, and President from 1899-1902. He received the honour of knighthood in 1902. The following is a list of the offices held by him in the Institute :—

Member of Council, 1886-1893 ; Chairman of the Board of Examiners, 1902-1905 ; Member of the Art Standing Committee, 1886-1890 and 1903-1905 (Vice-Chairman 1903-4) ; Member of Prizes and Studentships Committee, 1885-1893 and 1899-1911 ; Member of the Board of Professional Defence, 1904-5 ; Member of the Seventh International Congress of Architects (General Committee), 1905-6.

BY MAURICE B. ADAMS [*F.*].

I willingly respond to the Editor's request and in an informal personal way write an additional obituary about our late President, Sir William Emerson, for the Institute JOURNAL. While thus complying, it is my desire to avoid giving egotistic references on the one hand and enumerating on the other those particulars of his life and works which may be furnished by other friends. Sir William Emerson was knighted in 1902 and by this title is familiar now to most of our members. He entered into my life when he was about twenty-five, therefore my senior by some six years. His offices were at No. 1 Westminster Chambers, then only recently erected. He had served two terms of pupilage. First, with Habershon and Pite in Bloomsbury Square, and secondly with William Burges in Buckingham Street, Adelphi, before he commenced practice in Bombay. He immediately became very busy, having influential connections in India. His first important undertaking consisted in erecting big premises for Messrs. Treacher, besides the Takhtsingji Hospital, Shavnagar, which was followed by the Muir College and the University of Allahabad, as well as All Saints' Cathedral, Cannington, near Allahabad. It will be remembered that his master, Wm. Burges, had some time before designed the School of Art at Bombay, marked by his particular mediæval mannerisms in the style by which he became famous. Emerson, an ever true and devoted pupil, carefully adhered to this phase of French Gothic when at the outset of his career he built his charming little Church at Girgaum, near Bombay. I remember he was very proud of this building. The palace for the Maharajah of Bhownugger followed later, in which Indian forms and precedents were ingeniously intermingled with European mediævalisms. The detail drawings for some of these larger buildings were being worked out in my time as an improver in his office, which occurred before my own articles had expired owing to the sudden death of my master, Horatio Nelson Goulty, of Brighton. His partner, Mr. John George Gibbins, F.R.I.B.A., introduced me to Sir William Emerson.

The second Emersonian episode marking our long acquaintanceship occurred in 1886, when Sir Arthur Blomfield, A.R.A., Sir William Emerson and Arthur Cates signed my nomination papers for the Fellowship of the Institute. A rival journalist sought to prevent my election, but the attempt failed, as all three of my sponsors refused to budge and stood their ground. I have not alluded to this affair before in print, and only mention the matter now to show how true a friend I had in Sir William Emerson.

The third circumstance to be named is distinguished by a wider interest. It happened in 1902, at the time of Sir William Emerson's Presidentship of the Royal Architectural Museum, with which I was connected for twenty-six years as Honorary Secretary. It may be remembered by some that our School of Art had become so successful that the classes brought in an average income of £2,000 a year, though the subscriptions to the Museum had declined meanwhile. The Architectural Association was hampered by its cramped quarters in Great Marlborough Street, which had long been inadequate for its increasing activities. Funds were lacking for the acquisition of suitable premises in an accessible situation. It was at this juncture my privilege to propose to the Council of the Royal Architectural Museum that our buildings in Tufton Street, Westminster, might be handed over as a free gift to the Architectural Association. This was done as everybody knows. Sir William Emerson supported the proposal. Without his co-operation the scheme would have been impracticable. Surely this has been forgotten, as the official notice of his death printed in the current issue of the *Architectural Association Journal* makes no mention of his good offices in this affair.

Sir William Emerson, years ago, erected "Little Sutton" in Chiswick for his own use. The house was set in beautiful grounds (near the Duke of Devonshire's Park) containing some enormous cedars, and was inspired by the decorative ideals realized by William Burges in his house in Melbury Road, Holland Park. Sir William was the kindest of hosts, and took great pleasure in showing the beauties of his home, which occupied the site of a house and gardens which existed before the time of Cromwell. Part of the stables and outbuildings he retained. Among the mural enrichments he used tiles made to his design at the School of Art, Bombay. Over the fireplace in the hall, set under an arch, was a bronze figure of Orpheus, having a background of mosaic. The decorations of the drawing room illustrated Chaucer's "House of Fame." The chimney piece, built of alabaster and Caen stone, enshrined a castle set upon a rock of glass in representation of ice. Various figures mentioned in the poem were carved in half round relief. The frieze round the apartment had typical figures illustrative of "Fame." "Little Sutton" exists no longer and the gardens have given place to streets and villas. The house was pulled down to make a widened thoroughfare.

SIR WILLIAM EMERSON'S PRINCIPAL WORKS.

Sir William Emerson built the Bombay markets and several churches in India, and on returning to England he designed, for the Government of India, the Allahabad University; he also designed the Cathedral of Lucknow, a large palace for the late Maharajah of Bhownuggur and the Takhtsingji Hospital at Bhownuggur. He won the first competition for Liverpool Cathedral in competition with Bodley and Garner and the late James Brooks, but the site for the cathedral was ultimately changed and the competition abandoned. Sir William was commissioned to design the Victoria Memorial Hall at Calcutta, the foundation stone of which was laid by King George V, when Prince of Wales, on 4 January 1906, and which was formally opened by the present Prince of Wales in 1921.

He designed in England St. Mary's Church at Brighton, Hamilton House on the Victoria Embankment and the New Royal Caledonian Asylum, and numerous private houses. He was one of the architects selected to compete in 1891 for the completion of the Victoria and Albert Museum.

Correspondence

THE LATE MR. PAUL WATERHOUSE.

To the Editor, JOURNAL, R.I.B.A.

As a member of the Defence League I should like to put on record the way in which Mr. Paul Waterhouse held the balance between the two parties.

Early in the movement Mr. Waterhouse wrote to me and asked me to call on him and state the case from our point of view. He gave me a very patient hearing, and discussed the matter in an absolutely unbiased way. I told him that as far as I was concerned, I was only out to protect the value of the qualification which our members had obtained by passing the examinations, in which I had taken an active part ever since they had been instituted, and he told me he had every sympathy with this.

I should also like to bear testimony to the valuable work of Mr. Waterhouse in connection with the Board of Education in investigating and reporting on the work in the various schools of architecture.

We were both interested in music, and I value very highly a letter he wrote me in criticising some church music I sent him, and he was good enough to lend me a copy of the Yattenden Hymnal, to which his father had contributed some beautiful compositions.

H. D. SEARLES-WOOD [*F.*]

9, Old Square, Lincoln's Inn, W.C.
20 January 1925.

To the Editor, JOURNAL R.I.B.A.

DEAR SIR,—Letters in your columns and elsewhere have left no doubt in the public mind as to the loss sustained by the Royal Institute and by architects generally through the passing of Paul Waterhouse. These tributes have very properly come from those who were privileged to rank in the circle of his intimates. A repetition of such eulogies by anyone outside this circle would be presumption, but if I may venture to speak for those who could only call themselves acquaintances and were associated with him in a minor capacity in his Institute work, I believe that I shall be voicing their feelings by saying that the loss comes home as that of a close personal friend. It must be seldom indeed that a body of mourners, including so many claiming but very slight ties, find themselves so deeply moved as during that simple graveside service in which we were allowed to take part.—I am, Sir, yours

ALAN E. MUNBY [*F.*]

ST. PAUL'S CATHEDRAL.

19 *January* 1925.

To the Editor, JOURNAL, R.I.B.A.

SIR,—In connection with the recent celebration of the bicentenary of Sir Christopher Wren, the Royal Institute of British Architects published a book on Wren and his work (including St. Paul's Cathedral), written by contributors, each intimately acquainted with the aspect with which he dealt.

As the profits of the sale are devoted to the St. Paul's Preservation Fund, possibly many people might consider that a pleasant way to help the fund would be to obtain this attractive and well-illustrated record, of which the title is *Sir Christopher Wren Memorial Volume*: 1723–1923. The sale of only 1,000 copies of the five guineas edition would enable the R.I.B.A. to hand over a sum of 2,000 guineas, to be acknowledged in *The Times* list in the name of each purchaser as a subscriber of two guineas.

The price is £5 5s., and orders, enclosing remittance, should be sent to the Librarian, R.I.B.A., 9 Conduit Street, London, W.1.—Yours truly,

J. ALFRED GOTCH,
President R.I.B.A.

61, *South Molton Street, W.*
January 9, 1925.

To the Editor, JOURNAL R.I.B.A.

SIR,—The correspondence which has recently appeared in the Press with reference to Sir Francis Fox's warning in 1912, makes one or two comments desirable in order to avoid the public, who are deeply interested in the safety of the Cathedral, being misled as to the real position with regard to the piers. Sir Francis Fox's general estimate of the dangerous condition of the piers was undoubtedly right. His assumption that this could be remedied by grouting must have been made under the impression that the piers were composed of solid masonry. It is known to-day that the interior of the piers is composed of rubble. No grouting by any scientific process known to man could restore solidity to these piers in their present condition. May I go a little further and say without offence to a great sister profession, that St. Paul's Cathedral was erected by the combined skill of the architect and the builder, and it is only by the combined skill of the architect and the builder that it can be preserved to-day.

If Sir Christopher Wren had had at his command an adequate supply of Portland stone, these piers would have been built solid in that material, and we should not now be trembling for the safety of this great Cathedral.

The only remedy to-day is, I am persuaded, and architects generally will agree, to replace these untrustworthy piers by piers of solid Portland stone, and whatever the cost, and however great the difficulty, we shall be unworthy trustees of one of the world's greatest monuments if we refuse the one, or shirk the other.—Yours faithfully,

EDMUND W. WIMPERIS [*F.*].

ORIENTATION OF WESTMINSTER.

70A, *Basinghall Street, London, E.C.2.*
13 *January* 1925.

To the Editor, JOURNAL R.I.B.A.

DEAR SIR,—Can anything be done to remove the widespread misapprehension that appears to exist as to the points of the compass when speaking of the Westminster district?

Not long ago an eminent member, writing in the JOURNAL, referred to the "North" front of the County Hall (an error to which I drew attention at the time); I see repeated allusions in the public press to the "South" end of Westminster Bridge; and according to the JOURNAL of the 10th inst., Lord Newton, speaking at a recent dinner of the Architecture Club, referred (if correctly reported) to the "South" side of Parliament Street.

The proximity of the Abbey and St. Margaret's Church, which are correctly orientated, should enable any observer to satisfy himself as to the facts, without reference to a map.—Yours faithfully,

J. CHARLES BOURNE, *Licentiate*.

MR. LISHMAN'S WATER COLOUR DRAWINGS.

Architects often seek relaxation in drawing in water colours, but it is only occasionally that their works are seen at exhibitions. Sir Ernest George achieved great distinction in this medium and he was a regular exhibitor at the Royal Academy Summer Exhibition; Mr. Alfred Waterhouse was also very happy in his water colour drawings; Mr. Rickards, a few years before his death, began to sketch in water colours, but these never equalled his masterly pencil and pen drawings; the exhibition of Mr. Collcutt's drawings in the Institute galleries recently came as a surprise to many of his friends, who were not aware of his skill in this direction. Mr. Guy Dawber and Mr. Edgar Wood's drawings are well known, and Mr. Alfred B. Yeates has his niche amongst contemporary artists.

But apart from Sir Ernest George it is rarely that an architect ventures on a one man show of water colours. Mr. Frank Lishman, the late consulting architect to the United Provinces of India, is doing so at the Walker Galleries, Bond Street, and his courage, we think, is justified by the event. He has on exhibition over eighty drawings which may vary a little in quality but which, as a whole, indicate the work of an accomplished artist who is not limited to any technical formula but adapts his method of treatment to his type of subject. The majority of his

drawings depict scenes in the United Provinces, and if we look at his charming drawing, with the white mausoleum, looking like a splendid palace, of the Taj Mahal, placed in its formal garden with its decorative trees, and then look at his bathing festival scene on the Ganges, we realise the artist's gift for decorative and formalistic, as well as purely impressionistic treatment of his subjects. In his Indian drawings we have depicted many scenes on the Ganges, numerous buildings, occasional street views, landscapes showing the Himalayas in the distance, and other subjects which appealed to him during his twelve years' residence in the United Provinces, all drawn with skill and an appreciation of picturesque effect.

From India we may follow Mr. Lishman to Italy and France. We remember especially in his Italian drawings his views of the Ducal Palace (one of his best drawings at the exhibition), two gay views of the Rialto at night time, and a Salute drawn from a point of view, the lower reaches of the Canal, which is rarely attempted by artists in depicting the most picturesque church in the world. Scenes at Montepulciano and San Gimignano, painted under wintry skies, and "The Quirinale at Rome," are drawings which also remain in the memory. Amongst his French drawings the most attractive is his "Spring Morning in Paris," a river view which takes in the Pont Alexandre Trois, and the embankments on each side lined with their rows of trees not yet bursting into leaf, and a glimpse of the Grand Palais on the right. In this drawing Mr. Lishman is particularly successful in representing the clear, crisp atmosphere of Paris on a spring morning, an atmosphere which contributes so largely to the spirit of gaiety which affects Parisians and visitors to Paris.

Mr. Lishman has also at the exhibition fourteen views of London which include the "British Museum Extensions," "In St. Paul's Garden," "Limehouse Basin," "Cannon Street," "Chancery Lane" (during the building of the Records office) and the "Last of the Quadrant," interesting drawings which show London in its transitory phase of the past ten years or so.

THE ANNUAL CONVENTION OF THE AMERICAN INSTITUTE OF ARCHITECTS.

The President of the Royal Institute of British Architects desires to bring to the notice of all members of the R.I.B.A. and of the Allied Societies the following letter which he has just had the pleasure of receiving from the President of the American Institute of Architects :

The American Institute of Architects,
Washington, D.C.
28 *November* 1924.

DEAR SIR,—The American Institute of Architects extends to you and all the members of your organisation a cordial invitation to attend the 58th Annual Convention of the Institute. The Convention will occur in New York City, 20 to 24 April 1925. In conjunction with the Convention an Architectural Exhibition will be held from 20 April to 2 May.

The Architectural League, painters and sculptors, landscape men and town planners, and, in fact, also the building industry, are joining hands with the Institute to arrange an "Exposition of Architecture and the Allied Arts," which promises to be unique. Our brother architects of other countries we hope will be interested to have some of their best work represented and to have some of their ablest members present.

Following this formal invitation it is our desire, if it please you, that further detailed information shall be sent you regarding the Convention programme and the Exhibition as well.

Hoping that we may have the privilege of welcoming you and other representatives of your society, I beg to subscribe myself,—Faithfully yours,

(Signed) D. EVERETT WAID,
President.

J. Alfred Gotch, Esq., F.S.A.,
President R.I.B.A.

It is hoped that a substantial number of British Architects will be able to take advantage of this most welcome invitation, and that they will in due course send their names to the Secretary of the R.I.B.A. for transmission to New York.

In connection with the invitation received from the American Institute of Architects for members of the R.I.B.A. to attend the 58th Annual Convention to be held in New York 20 to 24 April, the following particulars with regard to steamship sailings may be of interest to intending visitors. (See JOURNAL, p. 154, 10 January.)

The Cunard s.s. *Mauretania* will sail from Southampton and the s.s. *Laconia* will sail from Liverpool on 11 April. The minimum single passage rates for these steamers in April are as follows :—

s.s. *Mauretania* ..	£58 15s.	Saloon.
	£34 os.	Second class.
s.s. *Laconia* ..	£45 10s.	Saloon.
	£31 os.	Second class.

The White Star s.s. *Olympic* and s.s. *Homeric* will sail from Southampton on 8 and 15 April respectively.

In addition to passage rates the United States Head Tax of £2 per passenger is also payable, but this can be reclaimed provided the passengers leave the States within sixty days.

A slight saving of tax can also be effected if passengers book their return passage before leaving on the westward journey.

Arrangements will be made by the R.I.B.A. with the steamship companies for the special reservation of accommodation on any of the above steamers provided early intimation is given to the Secretary R.I.B.A. by members who intend to join the party.

IAN MACALISTER,
Secretary R.I.B.A.

Thames Bridges

A deputation consisting of representatives of the R.I.B.A., the Town Planning Institute, the London Society, and the Architecture Club was received on the 19th inst. by the Special Committee of the London County Council, who are considering the problem of the bridges over the Thames. The members of the deputation were Sir Banister Fletcher and Mr. L. H. Bucknell, representing the Royal Institute of British Architects; Lord Crawford and Balcarres, Sir William Davison, M.P., and Mr. D. Barclay Niven, representing the London Society; Professor S. D. Adshead and Mr. W. R. Davidge, representing the Town Planning Institute; and Mr. E. Vincent Harris and Mr. E. G. Culpin, representing the Architecture Club. Mr. Ronald Norman, chairman of the Special Committee, presided. The Chairman and Vice-Chairman of the London County Council were present, as were also Sir James Bird, Clerk to the London County Council; Mr. G. W. Humphreys, Chief Engineer; and Mr. F. Hunt, Valuer.

The proposals placed before the Committee are printed below.

Lord Crawford, who introduced the deputation, said it was essential that the general traffic problem and the future development of London should be considered simultaneously with the question of the construction or reconstruction of the Thames bridges. The deputation was strongly opposed to the expenditure of a large sum of money on a bridge at St. Paul's. Such a bridge, if carrying any considerable volume of traffic, would seriously interfere with the all-important traffic passing east and west through St. Paul's Churchyard.

Mr. Davidge, speaking on behalf of the deputation, pointed out that, although six new bridges had been constructed across the Thames in the eighteenth century and nine new bridges in the nineteenth century, none had been constructed in the twentieth century, apart from reconstruction of existing bridges. In point of fact, apart from the Tower Bridge, Wandsworth Bridge, and the two iron suspension bridges at Battersea Park, London had exactly the same bridges as in 1831, when the population was less than one-fourth of what it is to-day. The need for new bridges was very considerable, and the essential principle was that such bridges as were constructed should help to divert traffic from the more congested points.

A map, prepared by Mr. Davidge, was submitted to the committee to illustrate the proposals of the deputation.

By-pass roads to divert traffic from the central portion of London, Mr. Davidge proceeded, were in course of construction, particularly on north circular and south circular routes, and it was essential, to render these effective, that new bridges should be constructed at Lots Road and Woolwich. In the latter case an overhead bridge was suggested from the level of Woolwich Common, passing over the river and Albert Docks, reaching ground level at Barking by-pass road. This bridge would be about two miles in length. In the West of London an opportunity existed for the construction of a by-pass road along the line of the West London Extension Railway from Shepherd's Bush to Chelsea, which would have the effect of diverting much of the traffic at present congesting Oxford Circus and Piccadilly. A new bridge at Barnes and further new bridges at Mortlake and Richmond were already under consideration by the Ministry of Transport, and, although these were outside the London County Council area, there was no doubt that the construction of such bridges was essential.

In regard to the L.C.C. area itself, the deputation suggested that the continuation of the Chelsea Embankment to Putney Bridge would afford a valuable relief road to the present congested Fulham Road and King's Road, and it would also afford an opportunity for the construction of a new bridge from West Hill, Wandsworth, to the new embankment at Hurlingham. The rebuilding of Lambeth Bridge was essential, but, in the opinion of the deputation, it was very desirable that the bridges on the west side should be considerably improved so as to divert the traffic south of Victoria Station, instead of congesting the narrow Horseferry Road and turning a fresh volume of traffic into Victoria Street.

The question of the central bridges was then discussed. It was the unanimous opinion of the deputation, Mr. Davidge said, that Charing Cross Bridge was essential, and, as negotiations with the railway company must occupy some time, they urged that these should begin at once, and that meantime a general plan for the development of the south side of the river, including a realignment of the railway system on that side, should be taken into consideration. A new bridge at the eastern end of Aldwych would undoubtedly be necessary eventually, and the opinion of the deputation was that steps should be taken to forward the construction of such a bridge, which would materially assist a decision being reached as to the width of Waterloo Bridge, whether the latter was retained as at present or rebuilt, if such a necessity should arise. The deputation were united in opposition to the proposed St. Paul's Bridge, and they advocated that a general plan should be drawn up for carrying through the improvements which had been suggested. The societies concerned were willing to assist the Council in the preparation of such plans by every means in their power.

The Chairman thanked the deputation for their offer of assistance in preparing a general plan of improvements, and he and the other members of the committee said they were greatly interested in the suggestions which had been put forward. They asked the deputation to indicate what, in their view, was the relative order of importance of the new works they had suggested.

There was a consensus of opinion among the deputation that the bridges which could be constructed with least difficulty were those outside the county, but of those inside the county Charing Cross Bridge should have the earliest consideration. Afterwards the extension of the Chelsea Embankment and the other bridges connected with it could be taken in hand. The reconstruction of Lambeth Bridge, although it would not provide an ideal new route, would be extremely valuable in relieving Westminster Bridge, and it was a scheme that could be effected without much difficulty.

The Chairman expressed appreciation of the suggestions which had been put forward by the deputation. The special committee, he said, were dealing with bridges only; other committees were concerned with the cognate matters which had been dealt with by the spokesman of the deputation; but he (the Chairman) would see, however, that the expressions of opinion given on the other matters were conveyed to the appropriate quarters. He added that it would be important to obtain an exact census of the origin and destination of the traffic crossing the existing bridges. When that was available it would be of considerable assistance in determining the exact points at which new bridges were necessary.

THE JOINT COMMITTEE'S MEMORANDUM

† A Memorandum prepared by a Joint Committee of the Royal Institute of British Architects, the London Society, the Town Planning Institute and the Architecture Club for the consideration of the Special Committee on Thames Bridges, London County Council.

[NOTE.—*This Memorandum consists of three statements by*

the Royal Institute of British Architects, the Town Planning Institute, and the London Society, headed A, B, and C respectively. The Architecture Club do not desire to submit a statement.]

A. THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

1. As it must be taken for granted that the problem of Thames bridges with which the London County Council is faced cannot be separated from that of traffic congestion in London generally, it is essential that the two should be considered in conjunction and that every possible measure should be taken to accelerate the investigations on which a comprehensive scheme can be based.

2. It is assumed that the existing condition of Waterloo Bridge has raised the problem of the cross-river traffic between Blackfriars and Vauxhall Bridges in its present acute form. The Royal Institute therefore propose to confine their recommendations in the main to this part of the river only. The problem appears to fall under three heads: Waterloo Bridge itself, the stretch of river between Waterloo and Blackfriars Bridges, and that between Waterloo and Vauxhall Bridges.

3. WATERLOO BRIDGE.—As regards Waterloo Bridge itself, the possibility of underpinning having been referred to the Institution of Civil Engineers, the Royal Institute, while believing that it will be found possible to preserve a structure of such outstanding artistic merit, desire to express their confidence in the judgment of the Institution of Civil Engineers.

Whether the eventual decision be to retain the present bridge, to widen it or to reconstruct it, the conflict between its traffic and that along the Strand is typical of the main difficulty underlying the problem of Thames bridges as a whole, namely, the impinging of the cross-river routes on the great volume of traffic running parallel to the north bank of the Thames. It would be most desirable if in this case a north and south route could be devised at another level from that of the Strand.

4. WATERLOO BRIDGE TO BLACKFRIARS BRIDGE.—The existing inadequate provision for north and south traffic, and the great inconvenience at present experienced during the "rush hours" by workers in the City of London who reside south of the Thames, point to the need for a new bridge at a point near the Temple Station.

The construction of a double-decked bridge at this point is therefore suggested, together with a tram subway from the Embankment under the eastern arm of Aldwych, utilising that in Kingsway and continued northward under Southampton Row. This subway, it is suggested, might pass under Euston Road and the Metropolitan Railway and emerge in Seymour Street. In this way the Camden Town Tramway System may be linked up directly with that of South London by a line crossing the lower deck of the suggested bridge near the Temple Station to the Surrey side and emerging into a road leading to a point in front of the Old Vic Theatre.

Should the Institution of Civil Engineers report in favour of underpinning Waterloo Bridge, and the London County Council decide in favour of that step, it might be found possible to deal with the traffic in this area without widening the latter bridge at all. It could be used for northward traffic only, and the Temple Bridge for southward traffic, and thus a complete circuit would be formed on a line via the Old Vic—Waterloo Road—Waterloo Bridge—Aldwych and southwards over the bridge at the Temple to the Old Vic again.

5. WATERLOO BRIDGE TO VAUXHALL BRIDGE.—Without venturing to advocate any one of the many schemes which have been suggested for a new bridge at Charing Cross, the Royal Institute reiterate their conviction that there is a need for a road bridge at this point. A detailed study of the approaches to such a bridge, both on the north and south sides of the river, is of the utmost importance, and on no account must the traffic which it carries be allowed to debouch upon the Embankment or the Strand. It must be carried either above or below these thoroughfares in order to avoid adding to the present congestion at Charing Cross.

With regard to Lambeth Bridge, it appears essential that the main approach from the west must be south of Victoria Station.

6. ST. PAUL'S BRIDGE.—The attitude adopted in February, 1924, by the R.I.B.A., the Town Planning Institute, the London Society and the Architecture Club with regard to the proposal to build a bridge at a point opposite St. Paul's is unchanged. The reasons for their opposition to this project were widely published at the time. It is not desired to reiterate on this occasion the many objections to it; but the four societies concerned oppose and will continue to oppose the execution of such a scheme.

7. Finally it is desired to urge the great importance in any bridge scheme of expert architectural treatment in regard to the design of the bridge itself, and of expert planning in regard to its approaches. The traffic which a bridge will attract, the methods to be employed for its disposal, and its effect upon the development of surrounding areas are problems which the skill of the town-planner has set itself to solve. Nor, in regard to the design of the bridge itself, is it enough for the engineer and the architect to work in water-tight compartments, the former concerned only with questions of construction and safety, the latter with those of superficial decoration and too often called upon merely to "ornament" a structural design already complete. A bridge is beautiful only if its artistic form is a true expression of its construction; and it is therefore essential, if London's bridges of the future are to be worthy of her great river, that æsthetic considerations in their design should be taken into account at the very beginning and should mature, *pari passu*, with the structural.

B. THE TOWN PLANNING INSTITUTE.

The Town Planning Institute have given careful consideration to the question of London Traffic and Thames Bridges, and are of opinion that the provision of new bridges cannot be properly considered apart from the general question of London Development, and they desire respectfully to emphasise the necessity for the preparation of a comprehensive plan, on which the systematic improvement of London can proceed. Such a plan should deal with both town planning and zoning.

They would emphasise that the principles to be adopted should be (*a*) to avoid unnecessary traffic that at present arises through lack of zoning, (*b*) to relieve the existing congested centres and thoroughfares of all except necessary traffic originating or terminating in the immediate locality.

They therefore suggest:—

1. That all through traffic should be as far as possible provided with a by-pass or alternative route.

2. That as the greater part of the existing congestion is due to blocks caused by cross traffic, all important crossing places should either provide (*a*) for circular regulation of traffic, or (*b*) where possible the two streams of traffic should cross at different levels.

Confining their recommendations, however, at this stage, to the question of Thames Bridges, they would point out that from the Tower Bridge to Kingston Bridge, both inclusive, a distance of 21 miles, there are only 16 road bridges, and that owing to the loss of Lambeth Bridge, there are exactly the same number of road bridges across the Thames as existed 50 years ago, when the population was considerably less than half its present size.

The provision of additional road bridges across the Thames is therefore an essential part of a development plan for London.

The new bridges proposed on the Chertsey Road will provide additional bridges at Chiswick and Richmond, but although this will provide a valuable outlet in a south-western direction, it will not appreciably affect the congestion in Central London.

The Town Planning Institute therefore favour the construction of such further new roads, embankments, and bridges as will enable through traffic to proceed to its destination either in the centre or beyond London with the least possible hindrance.

The Town Planning Institute support the following :—

1. The completion and linking up of the north and south circular roads.
2. The extension of Chelsea Embankment to Putney Bridge.
3. The construction of a By-pass south of King Street, Hammersmith, to connect the new Chertsey Road with Fulham Palace Road.
4. The construction of a new road over the District Railway in continuation of the above and connecting with the west end of Cromwell Road.
5. The construction of a new road over the West London Extension Railway from the new Western Avenue at Shepherd's Bush to Battersea and connecting via Clapham Common with the South Circular Road, involving a double deck bridge over the river at Lots Road.
6. A new road from the eastern end of the Great West Road at Chiswick High Road to Barnes Railway Station, with a new bridge about one-sixth mile north-east of Barnes Railway Bridge.
7. A new bridge over the river from West Hill, Wandsworth, to Hurlingham connecting with the new embankment on the north side.
8. A new road from Wandsworth Bridge to Trinity Road, Wandsworth.
9. The rebuilding of Lambeth Bridge, and a new road south of Victoria Station via Page Street, Vincent Square and Warwick Street.
10. A new high level bridge at Woolwich (in preference to a road tunnel) passing over the river and Albert Docks and connecting Woolwich Common with the new Barking By-pass at Becton, reaching ground level at the northern outfall sewer.
11. A new bridge across the Lea at Canning Town and new approaches to the Docks as recommended by the Ministry of Transport.
12. A new road tunnel between Purfleet and Dartford as recommended by the Ministry of Transport.

It will be seen that the above proposals, in addition to the two new bridges and road tunnel already proposed by the Ministry of Transport, will eventually involve the construction of additional embankments and four additional road bridges, as follows :—

1. A double rail and road bridge at Lots Road.
2. A new road bridge at Barnes.
3. A new road bridge at Hurlingham.
4. A high level bridge at Woolwich.
5. The rebuilding of Lambeth Bridge and new approaches on west side.
6. A new road connecting Wandsworth Bridge and Trinity Road.

They also support :—

7. A new bridge at Charing Cross.
8. A new bridge at the eastern end of Aldwych.

C. THE LONDON SOCIETY.

The London Society consider that there are two separate problems for which solutions must be found :—

1. The long distance traffic between the counties lying north and south of the Thames.
2. Cross-river communication for local purposes between North and South London.

With regard to 1, the Society are of opinion that this traffic should be diverted from the London area by the improvement of arterial roads, and the provision of new bridges and tunnels, outside this area. This is an additional and conclusive reason against the project of a bridge at St. Paul's.

With regard to 2, the Society believe that the development of the south side of the Thames (so well commenced by the example of the London County Council) can never be realised until additional and improved communications across the river are provided by the erection of a traffic bridge at Charing Cross in place of the existing railway bridge, and of the new bridge at Lambeth.

The Society are also of opinion that, if possible, Waterloo Bridge should not be altered from its present form, although it may be necessary to have further increased bridge accommodation for the South of London.

We look forward to the complete abolition of railway bridges in the central area and the substitution of electrified under-river communication for railway traffic ; further, for the provision on road bridges of moving platforms for foot passengers, as these are now within the realm of practical engineering.

In our opinion, discussion concerning these Central London Bridges cannot serve any useful purpose unless a plan for the development of London south of the Thames (including proposals for the future of the railways) is considered at the same time. If this is not done, any piecemeal dealing with the problem will only be a palliative for the present situation, without regard to " London of the future."

January, 1925.

VISIT TO THE WALLACE COLLECTION.

On Saturday, the 10th inst., a very interesting visit was made to the above Collection. About 25 members of the R.I.B.A. attended and were at first addressed by Mr. C. H. S. John in the lecture room. In this address he traced briefly the outline of the history of the Wallace Collection through four generations, from the first Marquis of Hertford, born 1718, died 1784, to Sir Richard Wallace, 1818–1890, who arranged Hertford House to hold his treasures. It was presented to the nation by Lady Wallace in 1900.

The visitors were then led to the picture gallery, when Mr. John explained in detail the principal pictures. Mr. Hurst Seager, in proposing a vote of thanks, said they were very much indebted to Mr. John for making examination of the pictures much more interesting than it would otherwise have been. With the recollection of the galleries in all parts of the world he had visited, he could say that the Wallace Collection was one of the best, not only for the wealth of the exhibits which Mr. John had pointed out, but also on account of the extremely pleasing arrangement.

R.I.B.A. Prizes and Studentships, 1925

Deed of Award

The designs and drawings submitted for the Prizes and Studentships in the gift of the Royal Institute are now on exhibition in the R.I.B.A. Galleries, 9 Conduit Street, and will remain open to members and the public until 2 February (10 a.m. till 8 p.m., Saturdays 5 p.m.). The Council's Deed of Award, read at the General Meeting of 19 January, gives the results as follows :—

THE ROYAL INSTITUTE SILVER MEDALS.

1. *The Essay Medal and Fifty Pounds.*

Five Essays were received under the mottoes :—

1. "Alpheus."
2. "Let us now praise famous men and our fathers that begat us."
3. "Speranza."
4. "Prudens."
5. "Londinium."

The Council have awarded the Silver Medal and Fifty Pounds to the author of the Essay entitled "The Æsthetics of the Ancients," submitted under the motto "Alpheus"* ; and a Certificate of Honourable Mention to the author of the Essay entitled "The Architect in History, his Training, Status and Work," submitted under the motto "Let us now praise famous men and our fathers that begat us." †

2. *The Measured Drawings Medal and Fifty Pounds.*

Five sets of drawings were sent in of the several buildings enumerated under mottoes as follows :—

1. "Bee" ; 4 strainers, 1 sheet and loose sketches. (The Pantheon, Paris.)
2. "La Justizia Sapienza" ; 10 sheets and book of sketches. (Fitzwilliam Museum, Cambridge.)
3. "Sapper" ; 5 sheets and book of sketches. (Temple of Bacchus, Baalbek.)
4. "Blue Diamond" (Device) ; 5 strainers, loose sketches and book of sketches. (Hampton Court Palace.)
5. "A.M.D.G." ; 7 strainers, loose sketches and book of sketches (Chiesa della Salute, Venice.)

The Council have awarded the Silver Medal and Fifty Pounds to the delineator of the drawings submitted under the motto "Bee"‡ ; and a Certificate of Honourable Mention to the delineator of the drawings submitted under the motto "A.M.D.G." §

* Frank Pentland Chambers, B.A. (Cantab.), Pâli, 18 Alleyn Park, West Dulwich, S.E.21.

† Martin S. Briggs, F.R.I.B.A., 9 Winterstoke Gardens, Mill Hill, N.W.7.

‡ Richard W. Briggs, B.A., A.R.I.B.A., 46 Alexandra Road South, Alexandra Park, Manchester.

§ Jack Antonio Coia, A.R.I.B.A., 88 Drumother Drive, Parkhead, Glasgow.

THE TRAVELLING STUDENTSHIPS.

1. *The Tite Prize and One Hundred Pounds.*

Twenty-six designs for a Small Museum were submitted under the following mottoes :—

	Strainers.
1. "Porphyry"	3
2. "Spade"	4
3. "Fuit Ilium"	4
4. "Pip"	4
5. "Pantile"	4
6. "Capri"	5
7. "Sand"	4
8. "Ogee"	4
9. "Gellio"	4
10. "Pecksniff"	4
11. "Plot"	4
12. "Key"	4
13. "Snowy"	4
14. "Penates"	4
15. "Vela Rossa"	5
16. "Chianti"	4
17. "Ave atque Vale"	4
18. "Ilium Fuit"	4
19. "Volicita"	4
20. "Fish"	4
21. "Blat"	4
22. "Tessera"	4
23. "Snark"	4
24. "Brink"	4
25. "Frog"	4
26. "Isis"	3

The Council have awarded the Certificate and, subject to the specified conditions, the sum of One Hundred Pounds to the author of the design submitted under the motto "Tessera*" ; and Certificates of Honourable Mention to the authors of the designs submitted under the mottoes "Key" † and "Chianti." ‡

2. *The Pugin Studentship and Seventy-Five Pounds.*

Four applications were received for the Pugin Studentship from the following gentlemen :—

1. Wm. Beadle	3 sheets
2. D. H. McMorran	3 strainers, 1 sheet
3. D. M. Mickelthwaite	3 strainers
4. E. H. H. Williams	4 strainers

The Council have awarded the Medal and, subject to the specified conditions, the sum of Seventy-Five Pounds to Mr. D. H. McMorran ; and a Certificate of Honourable Mention and Ten Pounds to Mr. E. H. H. Williams.

3. *The Owen Jones Studentship and One Hundred Pounds.*

Three applications were received for the Owen Jones Studentship from the following :—

1. E. Dinkel	6 strainers
2. J. Hollinshead	6 strainers
3. Miss L. Payne	6 strainers

* Mr. D. H. Beaty-Pownall, c/o The Architectural Association, 34 Bedford Square, London, W.C.

† Mr. John F. D. Scarborough, 49 Bernard Street, Russell Square, W.C.1.

‡ Miss Alison Sleigh, 16 Gordon Square, London, W.C.1.

The Council have awarded the Certificate and, subject to the specified conditions, the sum of One Hundred Pounds to Miss L. Payne.

4. *The Godwin Bursary and Wimperis Bequest : Silver Medal and One Hundred and Thirty Pounds.*

Two applications were received for the Godwin Bursary and Wimperis Bequest from the following gentlemen :—

1. Mr. L. H. Bucknell (*A*].
2. Mr. C. A. Farey [*A*.].

The Council have awarded the Medal and, subject to the specified conditions, the sum of One Hundred and Thirty Pounds to Mr. L. H. Bucknell [*A*].

5. *The R.I.B.A. (Alfred Bossom) Studentship : a Gold Medal and Two Hundred and Fifty Pounds.*

The Council have awarded Silver Medals to the authors of designs accompanied by reports for a Building for a Company formed to develop an Island Site, submitted under the following mottoes :—

*1. " Red Diamond " (Device) 3 sheets
†2. " Thol " .. .. .. 2 sheets
‡3. " Taxi " .. .. .. 3 strainers

The Council have awarded the Gold Medal, and, subject to the specified conditions, the sum of Two Hundred and Fifty Pounds to the author of the design and report submitted under the motto " Taxi."

THE GRISSELL GOLD MEDAL AND FIFTY POUNDS.

One design for a Dance Hall was submitted under the following motto :—

§ " Iona " : 6 strainers and book of calculations.

The Council have awarded the Medal and Fifty Pounds to the author of the design submitted under the motto " Iona."

THE ASHPITEL PRIZE, 1924.

The Council have, on the recommendation of the Board of Architectural Education, awarded the Ashpitel Prize (which is a Prize of Books, value £10, awarded to the candidate who has most highly distinguished himself among the candidates in the Final Examinations of the year) to Mr. Geoffrey Reynolds Barnsley, of 3 Paper Buildings, Temple, E.C.4, Probationer 1919, Student 1922, and who passed the Final Examination December 1924.

THE R.I.B.A. SILVER MEDAL FOR RECOGNISED SCHOOLS.

The Council have awarded the Silver Medal for the best set of drawings submitted at the Annual Exhibition by Post-graduate Students of the Recognised Schools exempted from the Final Examination to Miss Elsie Rogers, of the Manchester University School of Architecture.

* Mr. Frank Henry Heaven, A.R.I.B.A., 39 Coronation Street, Aberkenfig, Glam.

† Mr. Charles Thomas Bloodworth, 138 Derby Lane, Stoneycroft, Liverpool.

‡ Mr. Frank Edgar Bennett, A.R.I.B.A., 42A Markham Square, Chelsea, S.W.3.

§ Mr. Arthur Edwin Cameron, 18 Eastwood Road, South Woodford, E.18.

THE TRAVELLING STUDENTS' WORK.

Godwin Bursar, 1923.—The Council have approved the report of Mr. W. T. Benslyn [*A*.], who travelled in America.

Owen Jones Student, 1924.—The Council have approved the work of Mr. J. H. Sexton, who travelled in Italy.

EXAMINATION FOR THE R.I.B.A. DIPLOMA IN TOWN PLANNING.

On the recommendation of the Board of Architectural Education, the Council of the Royal Institute of British Architects have approved the following revised regulations for the examination :—

R.I.B.A. Diploma in Town Planning.

Regulations for the admission of candidates to the examination leading to the Diploma in Town Planning.

Candidates applying for admission to the Examination in Town Planning must be either : (*a*) Fellows of the R.I.B.A. ; (*b*) Associates of the R.I.B.A. ; or (*c*) Licentiates of the R.I.B.A.

The examination will be held annually in July, and candidates must make application to sit before 1 March in any year.

(1) *Applications.*—Candidates must submit in support of their applications :—

(i) An original study illustrated by sketches of an existing town or part of a town.

(ii) An original scheme for site planning, town planning or town development with a description.

(iii) A written thesis on a subject pertaining to town planning accompanied by a plan or plans.

(2) *Thesis.*—On the application being approved by the Board of Architectural Education, the candidate will be required to prepare a thesis and scheme to a special subject which will be set by the examiners. The subject will be the lay-out of an actual area, of which ordnance sheets will be supplied to the candidate, together with set conditions. The candidate must hand in this thesis and scheme at the beginning of the written examination.

Copies of the forms of application, which contain the regulations and syllabus for the examination, may be obtained free on application to the Secretary R.I.B.A.

13 January 1925.

THE R.I.B.A. (ARCHIBALD DAWNAY) SCHOLARSHIPS.

In accordance with the terms of the will of the late Sir Archibald Dawnay, the Royal Institute of British Architects offer annually, for competition between students of recognised schools, two scholarships, one of £75 per annum for one or two years, and one of £50 per annum for one or two years.

The scholarships are intended to foster

(1) The advanced study of all forms of construction, not necessarily steel work and reinforced concrete.

(2) The economic, skilful and practical use of materials.

(3) Work in which the main structural elements shall find their logical expression in the architectural design.

Candidates are advised that the completion of comparatively simple problems in all their structural aspects is to

be preferred to the superficial treatment of ambitious schemes. These problems are to be those normally set in the second and third years. The notebooks dealing with construction in those two years may also be submitted.

The competition is open to all students of recognised schools who are in the third year of their school course.

Successful competitors will be required to register as students of the R.I.B.A. before taking up the scholarship awarded.

In the first instance applications must be made through the principals of the various schools, who will nominate candidates and submit evidence of study as above on behalf of the student or students nominated. The applications should reach the Board *by the end of July in each year.*

The award will be made by a jury nominated by the Board of Architectural Education.

The scholarships will be tenable at anyrecognised school selected by the successful candidates, who will be required to devote their time particularly to the object of the scholarship, specified above.

Two-thirds of the amount of the scholarship awarded will be paid to the successful candidate when he starts his year's work at a recognised school, and the remaining one-third after he has submitted satisfactory evidence of his studies during the past year.

Applications for renewal of scholarships must be made by the students direct to the Board *not later than the end of July in each year*, and be accompanied by evidence of study during the past year.

In all cases the tenure of the scholarship for a second year will be subject to approval or revision by the Board.

The scholarships are open to all subjects of Britain or the British Dominions, but are tenable only in the British Isles.

Obituary

THE LATE MAJOR STEWART HENBEST CAPPER, M.A., F.S.A., [*A.*].

By Professor G. Baldwin Brown [*Hon. Associate*].

I am glad of the opportunity to add a word or two of a personal kind about my old and valued friend Henbest Capper, though the notice of his architectural work, alike as executant and as teacher, will be of chief importance to readers of the Journal. When one laments one's friend, so suddenly taken from the midst of his useful and important activities, it is not the work one thinks of first but the man. His life was productive in many spheres, and he was endowed with varied gifts, scholarly, administrative, educational and social, but he was always more than his work, and in whatever he essayed and carried out there was revealed his genial, flexible, unselfish nature. His was a sunny personality, always attractive, always helpful, and he was the best of companions and the most loyal of friends. Apart from intimate and delightful personal intercourse, the connection with him of the writer was largely academic. Head-boy or "Dux" of the Royal High School, Edinburgh, he pursued in that city his University studies mainly in the Classical Department, in which he took first class Honours. His enthusiasm for the work of the Greeks was of course kindled greatly by their monuments, as well as by their literature, and days spent with him in Athens during an International Congress of Archæology will long be remembered by the writer, when, amongst other archæological essays, they tried to identify remains of the original Cimonian masonry in the southern wall of the Acropolis.

While in the practice of his profession in Edinburgh, Major Capper took part in the work of the University, acting as examiner in the History and Theory of the Arts, a subject which appealed to his scholarly instincts, and for dealing with which he was specially well fitted through his wide knowledge of continental languages, and consequent familiarity with the best books on the subject in foreign tongues. Quite at ease in French and German, he added to these languages Spanish, which he came to know through his membership of the household of the late Sir Robert Morier at the British Embassy in Madrid, where he fulfilled both secretarial and tutorial duties. He made and kept many Spanish friends, and of course revelled in the fascinating architecture of the Peninsula. Hisacquisition of Arabic during the period of his war service in Egypt was, for a man of middle life, something of a feat, and was the necessary condition for his efficiency in his important work as Military Censor during the war, and his subsequent activities in the same branch under the Egyptian Ministry of the Interior. Those who knew him best in his home surroundings will be most ready to believe what we are told of his success in his Egyptian work, and his friends here will have no difficulty in accepting what a warmhearted comrade has written of him, "he was always considered the most popular man in Egypt, and will be terribly missed there."

By Alexander N. Paterson [*F.*].

The career of Henbest Capper was so diversified and so widely distributed geographically that a full appreciation of his brilliant and attractive personality would require the collaboration of many minds in many places to do it justice. But, although particulars regarding much of his work are unknown to me, of the man I can speak from long experience, our association having commenced in his later student days and having continued in closest friendship until his recent passing.

Although born of English parents within Greater London, Capper's earlier years from the age of nine were spent in Edinburgh. There his intellectual powers were already shown in the High School and later at the University, where in 1880 he graduated with first class honours in Classics. Before this he had studied for a session at Heidelberg.

Architecture he already aimed at as his life work, but about this time, the post being offered to him of tutor to the only son of Sir Robert Morier, then British Minister to Portugal, he accepted it with its advantages as a temporary situation. So much were his services appreciated, however, that he was induced to remain on as tutor and also as private secretary for several years, first at the Legation at Lisbon and latterly at the Embassy in Madrid, so that it was not until 1884, when already twenty-four years of age, that he commenced his active training at the Ecole des Beaux-Arts. Though late in life for such a step, he entered on his studies with the advantages conferred by a wide culture, together with a knowledge and appreciation of all that is best in Art.

Thus, though never a brilliant draughtsman, he quickly showed his ability in handling the various *projets* and the work generally of the school. His knowledge of languages, only to bear full fruit at a later stage in life, was also a useful asset in many ways. Already at this time, in addition to Latin and Greek, he was familiar with French, German, Italian, Portuguese and Spanish. On his entry at the Atelier Pascal, where I had preceded him by about a year, we were at once brought into close communion, made closer a little later by our taking rooms in common and by various jaunts together *en province* for sketching or refreshment after strenuous days and nights at the atelier and *en loge*. When not so engaged, many were the evenings spent with music, Capper at the piano—for he was a delightful executant and had an endless repertoire among the classics, with a special fondness for the Beethoven Sonatas.

From Paris, in 1887, he returned to Edinburgh, where, after a period gaining practical knowledge in the office of Mr. G. Washington Browne (now P.R.S.A.), he commenced practice, for a time with F. W. Simon, afterwards on his own account in St. Andrew Square. During the comparatively few years he was so occupied good work was produced in Edinburgh, Glasgow and elsewhere, mainly domestic, including, however, at Whiteinch, a suburb of the latter city, an interesting girls' orphanage. But, with the prospect of an extensive business in view, the scene of his labours was again changed in 1896.

Partly for health reasons, partly from his interest in education and young men and boys of all ranks and classes (a special characteristic throughout his life), he took up the appointment of Professor of Architecture at McGill University, Montreal, then offered to him. For seven years there, followed by nine in the similar position at the Victoria University, Manchester, the middle years of his life were spent with success. At both places I was privileged to visit him and to see something of his work, but fitting testimony of his worth as a teacher must be looked for from among those who were his students. But for another breakdown in health with the, to him, trying climate of Manchester, and the march of events leading up to the Great War, he might still have been with us as Professor Capper, the designation by which he was so long known.

In what proved to be the last chapter of his career may be seen yet another phase of his many-sided character: his intense patriotism and his love of soldiering. Already in Montreal, partly influenced by the Boer War then in progress, he had joined the Canadian Field Artillery, in which he attained the rank of captain. On returning to this country he obtained a transfer to the Manchester Volunteers, organised the O.T.C. of the University there, later linked with that of Leeds, and he was awarded the brevet rank of major. Although on medical advice he had resigned his professorship in 1912, when the war came he now, at 54, joined his battalion and with it (among the first of the Territorial Regiments to go on service) went to Egypt. Declared unfit, to his intense disappointment, for the strenuous campaign in Gallipoli, he was detained there as military censor of telegrams, a post which he continued to occupy throughout the war. For this his natural ability, together with his knowledge of languages (to these he now added Arabic to fit himself the better for his new duties) made him an ideal occupant, and on demobilisation he was given a position entailing similar responsible and confidential work in the European Department of the Ministry of the Interior at Cairo, in which he was occupied until the end.

His death is a great loss to his own country and to that of his temporary adoption: in that it is more personal it is all the greater to the many friends whom his generous, unselfish and altogether lovable character had made for him in each of the various centres in which he laboured. Of these friends I count myself happy to have been reckoned as one.

THE LATE FRANCIS G. NEWTON, *Licentiate*.

Mr. Newton died suddenly at Assiut, on the 29th December, from sleepy sickness.

Mr. Newton had been engaged on archæological work for several years. He assisted Dr. Duncan Mackenzie in his excavations in Sardinia and for the Palestine Exploration Fund in Southern Palestine. In recent years he also assisted Sir Arthur Evans at Knossos, in Crete, and for two seasons was architect on the staff of the joint expedition of the British Museum and the University Museum, Philadelphia, at Ur, in Southern Babylonia. After helping in the work of the Egypt Exploration Fund at El-Amarna, he was appointed last year director of the society's excavations in Egypt, and left two months ago for Egypt to carry on work. The premature death of Mr. Newton will prove a great loss to British archæology, for which he has done much successful work, especially in architecture.

Mr. William Walcot, [*F.*], the distinguished artist, writes: "Newton and I had arranged to meet in Rome next March and spend some time in Paris on our way to London, where we had decided that we should take an office and that I should collaborate with him in the rendering of drawings of his future discoveries. His premature death has put an end to our plans, leaving much good work undone. I have lost a loyal friend and delightful companion."

ARCHITECTS' BENEVOLENT SOCIETY.

Scheme of Insurance.

In view of the interest shown by architects in the Scheme of Insurance, the Council of the Architects' Benevolent Society have recently secured the help of an advisory committee of insurance specialists.

The Architects' Benevolent Society is now in a position to answer enquiries on every class of insurance business, whether concerning existing or contemplated policies, and is ready to give considered advice on all such questions.

NOTES FROM THE MINUTES OF THE COUNCIL MEETING,

5th January 1925.

Architectural Education.

On the recommendation of the Board of Architectural Education

(*a*) The Report of the Prizes Conference was approved, and the Board was authorized to take the necessary steps for carrying into effect the scheme for co-ordinating the Prizes and Studentships.

(*b*) A revised scheme for the R.I.B.A. (Archibald Dawnay) Scholarships was approved.

(*c*) The report of the R.I.B.A. Visiting Board on the School of Architecture of the Architectural Association was approved.

(*d*) The Ashpitel Prize for 1924 was awarded to Mr. G. R. Barnsley.

(*e*) The mark of distinction for a Thesis was awarded to Mr. H. R. Steele.

(*f*) Revised regulations for the conduct of the examination for the Diploma in Town Planning were approved.

Sir William Emerson, Past-President, and Mr. Paul Waterhouse, Past-President.

The Council directed that an expression of deep sympathy at the loss of these two Past-Presidents be conveyed to the relatives of the deceased.

Honours.

Messages of congratulations were sent to Sir Aston Webb (Past-President) and Sir Frank Dicksee (Hon Associate) upon the honours which His Majesty the King had recently been pleased to confer upon them.

The Incorporation of Architects in Scotland.

Approval was given to an alteration in Bye-law 37 of the Incorporation of Architects in Scotland.

London University Architectural Education Committee.

Mr. Arthur Keen was appointed to represent the R.I.B.A. on the London University Architectural Education Committee in place of the late Mr. Paul Waterhouse.

St. Paul's Bridge Conference.

Mr. L. H. Bucknell was appointed to represent the R.I.B.A. on the St. Paul's Bridge Conference in place of the late Mr. Paul Waterhouse.

The Royal Sanitary Institute and Sanitary Inspectors' Examination Joint Board.

Mr. H. D. Searles-Wood was nominated for appointment by the Minister of Health as a member of the Board.

Notices

The Seventh General Meeting (Ordinary) of the Session 1924-25 will be held on Monday, 2 February 1925, at 8.30 p.m., for the following purposes :—

To read the Minutes of the General Meeting (Ordinary) held on 19 January, 1925 ; formally to admit members attending for the first time since their election ; to announce the names of candidates nominated by the Council for election to the various classes of membership.

To announce the Council's nomination for the Royal Gold Medal, 1925.

The President to deliver his Address to Students and to present the Prizes and Studentships awarded by the Council for 1925.

Mr. Maurice E. Webb, D.S.O., M.C., [*F.*], to read a criticism on the designs and drawings submitted for the Prizes and Studentships.

STUDENTS, R.I.B.A.

The following candidates, having passed satisfactorily the architectural courses at the Recognised Schools indicated against their names, have been registered as "Students R.I.B.A."

Ali : Syed Aziz (Architectural Association), c/o The Architectural Association, 35 Bedford Square, W.C.1.

Ashburner : Edward Heathcott (Liverpool University), 5 Fairfield Road, Stockton Heath, Warrington.

Astbury : Frank Nicholas (Liverpool University), 13 Wolverhampton Road, Stafford.

Barnes : Thomas Scott (Architectural Association), Morden Lodge, Morden, Surrey.

Bhuta : Gopalji Mulji (Sir J. J. School of Art, Bombay), c/o Messrs. Gregson, Batley and King, King's Building, Fort, Bombay, India.

Butling : George Albert (Liverpool University), 79 Blantyre Road, Liverpool.

Crossley : Frederick Hamer (Liverpool University), 15 Arnside Road, Wallasey, Cheshire.

Dower : John Gordon (Cambridge University School of Architecture), "Willowdene," Ilkley, Yorkshire.

Enthoven : Roderick Eustace (Architectural Association), 3 Cleveland Gardens, W.2.

Fairhurst : Philip Garland (Victoria University, Manchester), Garth, Wilmslow, Cheshire.

Forster : Edward (London University), 1 Leaside Avenue, Muswell Hill, N.10.

Gatley : Geoffrey Higson (Victoria University, Manchester), Rockshire, Disley, Cheshire.

Grant : Garrow Gregor (Architectural Association), "The Wren's Nest," Speldhurst, Kent.

Greig : Jessie Marjorie (London University), "Highlands," Lampton, near Hounslow, Middlesex.

Griggs : Henry Thomas Brock (London University), "The Cabin," Alric Avenue, Malden, Surrey.

Harley : Thomas (Edinburgh College of Art), 85 Charlotte Street, W.1.

Hobday : Ralph (London University), 34 Chepstow Place, Bayswater, W.

Hope : Arthur Fentern (London University), "Canterton," Hatch End, Middlesex.

Jenkins : William Victor (Liverpool University), 20 Manville Road, Wallasey, Cheshire.

Jones : Anne Farewell, M.A.Oxon (Architectural Association), "Brenley," Mitcham Common, Surrey.

Lancashire : John Edwin (Sheffield University), "West Lawn," Fulwood Park, Sheffield.

Miller : Joseph Charles (Glasgow School of Architecture), 101 Stanmore Road, Mount Florida, Glasgow.

Miller : Joseph Haydn (Liverpool University), 604 Ormskirk Road, Pemberton, Wigan.

Minoprio : Charles Anthony (Liverpool University), 28 Alexandra Drive, Liverpool.

Moberly : Sylvia Grace (Architectural Association), 18 Gordon Square, W.C.1.

Monroe : Leonard (Cardiff Techniacl College), 27 Victoria Road, Penarth, South Wales.

Motafram : Jamshedji Dossabhoy (Sir J. J. School of Art, Bombay), 265 Lohar Street, Dhobi Talao, Bombay, India.

PAKINGTON : HON. HUMPHREY ARTHUR (Architectural Association), 9 Arundel Gardens, W.11.
PATERSON : ERIC ARNOLD (Sheffield University), 65 Clarendon Road, Fulwood, Sheffield.
PRIESTLEY : CLARENCE JOSEPH (Liverpool University), 15 Sandringham Road, Golders Green, N.W.11.
ROGERS : ELSIE (Victoria University, Manchester), 23 Albert Road, Whalley Range, Manchester.
SHARMA : PURSHOTTAM LAL (Sir J. J. School of Art, Bombay), c/o School of Architecture, Sir J. J. School of Art, Bombay, India.
SISSON : MARSHALL ARNOTT (London University), Hucclecote Court, near Gloucester.
SPENCELY : HUGH GREVILLE CASTLE (Liverpool University), Ashley House, Box, Wilts.
STEWART : ALEXANDER MALCOLM (Aberdeen, Robert Gordon's College), c/o Mrs. Noel, 38 Fairfield Road, Inverness.
THOMAS : BRYAN WILLIAM RYLANDS (Cardiff Technical College), " Briar Dene," North Road, Cardiff.
TIMMINS : SAMUEL DENNIS WALLEY (Architectural Association), c/o The Architectural Association, 34–36 Bedford Square, W.C.1.
WALL : MAUD AMY MARGARET (Liverpool University), 12 Devonshire Road, Liverpool.
WALLIS : KATHARINE MABEL (London University), 165 Pitshanger Lane, Ealing, W.5.
WATT : LESLIE ALEXANDER (McGill University, Montreal), 24 Maple Avenue, Ste Anne de Bellevue, Province Quebec, Canada.
WHITELEY : FRANK (Victoria University, Manchester), 67 South Drive, Chorlton-cum-Hardy, Manchester.
WILLS : THOMAS THEOPHILUS (Liverpool University), The Fold, Spring Vale, Wallasey, Cheshire.
WILSON : PERCY ROY (McGill University, Montreal), "Cedarhurst," Saulte Ste Marie, Ontario, Canada.
WRAY : KENNETH FLETCHER (Architectural Association), Strathmore, Conisborough, near Rotherham, Yorks.

Competitions

ROYAL SOCIETY OF ARTS.

MEMORIAL LIBRARY FOR A COLLEGE COMPETITION.

In order to encourage the study of designs for industrial purposes the second series of open competitions organised by the Royal Society of Arts will include a competition for a Memorial Library for a College suitable for housing a small but rare collection of books.

The conditions are as follows :

A Travelling Scholarship of the value of £150 for one year will be offered on the following conditions :

Candidates must not be over 35 years of age. They must be prepared to travel in France, Italy, Spain or Flanders for six months, which, however, may be broken up into periods of, say, three or two consecutive months.

SUBJECT OF COMPETITION.

The subject is a Memorial Library for a College, suitable for housing a small but rare collection of books.

The superficial area of the room is not to exceed 1,500 feet. The method of arranging the bookcases and displaying a few *objets d'art* is left to the competitor. Cost is not a primary consideration, and the use of expensive woods, as well as inlays of ivory, ebony or metal, in addition to marble, can be considered.

In a suitable place a commemorative panel or some other *motif* should remind the visitor of the origin of the Library. The scheme of the ceiling, which can be treated as a space for decorative painting, as well as the pattern of the floor, must harmonise with the whole design.

A preliminary competition of twelve hours will be held in London and other centres in April 1925. Candidates must give notice of their intention to compete to the Secretary of the Royal Society of Arts, not later than 14 March. For this competition the following drawings will be necessary :

A plan of the floor, one section, and a plan of the ceiling, all to the scale of a quarter of an inch to a foot.

For the final competition two months will be allowed to the competitors, selected after the first competition. The finished drawings are to include the following :

Plans of floor and ceiling and two sections to a scale of half an inch to a foot, a detail drawing of the fireplace or some other feature, showing the complete height and treatment of the room from floor to ceiling.

Competitors should bear in mind that electric lighting and central heating are to be considered.

The competition will take place in June 1925.

LEAGUE OF NATIONS.

COMPETITION FOR THE SELECTION OF A PLAN WITH A VIEW TO THE CONSTRUCTION OF A CONFERENCE HALL FOR THE LEAGUE OF NATIONS AT GENEVA.

The League of Nations will shortly hold a competition for the selection of a plan with a view to the construction of a Conference Hall at Geneva. The competition will be open to architects who are nationals of States Members of the League of Nations.

An International Jury consisting of well-known architects will examine the plans submitted and decide their order of merit.

A sum of 100,000 Swiss francs will be placed at the disposal of the Jury to be divided among the architects submitting the best plans.

A programme of the competition will be ready in February, 1925, and will be despatched from Geneva so that Governments and competitors may receive copies at approximately the same date. Copies for distant countries will therefore be despatched first.

The British Government will receive a certain number of free copies. These will be deposited at the Royal Institute of British Architects, and application should be made to the Secretary, R.I.B.A., 9, Conduit Street, W.1, by intending competitors.

Single copies can be procured direct from The Secretary-General of the League of Nations at Geneva, for the sum of 20 Swiss francs, payable in advance, but will not be forwarded until after the Government copies have been despatched.

On the nomination of the President of the Royal Institute, Sir John Burnet, A.R.A., has been appointed as the British representative on the Jury of assessors.

UGANDA RAILWAY NEW OFFICE, NAIROBI.

Apply to the Crown Agents for the Colonies, 4 Millbank, Westminster, S.W.1. Closing date for receiving designs, 28 February 1925. Assessor : Mr. William Dunn, F.R.I.B.A. Deposit £1 1s. Telegram received :—

" Reference New Railway Offices. Many requests received from competitors for extension of competition. Agree to one month extension. Please advertise this. Lists of questions and answers being sent by first mail for distribution."

THE NEW INSTITUTE FOR THE BLIND, BUENOS AIRES, ARGENTINE REPUBLIC.

An International Competition has been promoted for the Argentine Institution for the Blind, Buenos Aires, Argentine Republic.

A small number of copies of the Conditions have been

deposited in the R.I.B.A. Library for the information of British Architects who may desire to compete.

MOLD HOUSING SCHEME.

Members and Licentiates of the Royal Institute of British Architects must not take part in the above competition because the conditions are not in accordance with the published Regulations of the Royal Institute for Architectural Competitions.

MASONIC MEMORIAL COMPETITION.

Apply to The Grand Secretary, Freemasons' Hall, Great Queen Street, W.C.2. Last day for applying for conditions, 23 August 1924. Deposit, £1 1s. Closing date for receiving designs, 1 May 1925. Assessors: Sir Edwin Lutyens, R.A. [*F.*] (appointed by the President); Mr. Walter Cave [*F.*], Mr. A. Burnett Brown, F.S.I.

MANCHESTER ART GALLERY.

Apply to the Town Clerk, Town Hall, Manchester. Closing date for receiving designs, 28 February 1925. Assessors: Professor C. H. Reilly, O.B.E. [*F.*], Mr. Percy S. Worthington, Litt.D., F.S.A. [*F.*].

BRANCH PUBLIC LIBRARY, HAREHILLS, LEEDS.

Assessor, Mr. Percy S. Worthington, M.A., Litt.D., F.R.I.B.A. Last day, 16 February 1925. Apply to:—Thos. Thornton, Town Hall, Leeds.

BETHUNE MEMORIAL TO THE MISSING.

The Imperial War Graves Commission desire Members and Licentiates of the Royal Institute to be reminded that applications to take part in the above Competition from persons other than those who had signified their intention of competing on or before 1 January 1924 cannot be considered. Due notice of this regulation was published in the Professional Press on various occasions during August and September, 1923.

RUGBY U.D. COUNCIL HOUSING SCHEME.

Members and Licentiates of the Royal Institute of British Architects must not take part in the above competition, because the conditions are not in accordance with the published regulations of the Royal Institute for architectural competitions.

Members' Column

DISSOLUTION OF PARTNERSHIP.

We beg to give notice to our friends and clients that from 31 December 1924 we, the undersigned, have mutually agreed to dissolve the firm of Osborn, Pemberton and White. Mr. Guy Pemberton will practise separately at 20a Henley Street, Stratford-on-Avon, and at No. 120 Edmund Street, Birmingham, and Mr. John White will continue to practise at No. 40 Bennetts' Hill, Birmingham, and at Stratford-on-Avon, under the style of Osborn and White. (Signed) Guy Pemberton and John White.

APPOINTMENTS VACANT.

Vacancies exist for Architectural Assistants in the Public Works Department, Government of Hong Kong. Three years' agreement. Salary, £460 to £500, with further annual increments to a maximum of £1,000, subject to efficiency. Candidates should be Associates R.I.B.A., unmarried, age 24-32, experienced in design, working drawings, details, specifications and some knowledge of quantities. Experience in steel-framed buildings and reinforced concrete desirable. Further particulars and application forms can be obtained on application to the Crown Agent's Office, 4 Millbank, London, S.W.

APPOINTMENTS WANTED.

Architectural engineer of very large experience desires work, temporary or permanent, anywhere. Special qualifications in geology, mining, drainage, underpinning and shoring, ventilation and heating, foundations and dilapidations, building and land surveying, also levelling. Highest references. Willing to take charge of job.—Apply Box 8322, c/o Secretary R.I.B.A., 9 Conduit Street, W.

OFFICE BOY RECOMMENDED.

A member recommends a youth as office boy. Good references.—Apply to the Secretary R.I.B.A., 9 Conduit Street, London, W.1.

COMMENCEMENT OF PRACTICE.

Mr. H. M. R. Burgess [*A.*] has commenced practising at 77 Taff Street, Pontypridd.

BOOKS FOR SALE.

Architectural books (second-hand), about 150 vols., for sale. List sent.—Ashworth, Dome Buildings, Richmond, Surrey.

Minutes VI

Session 1924–1925.

At the Sixth General Meeting (Ordinary) of the Session 1924–1925, held on Monday, 19 January 1925, at 8 p.m., Mr. J. Alfred Gotch, F.S.A., President, and afterwards, Mr. E. Guy Dawber, F.S.A., Vice-President, in the chair:

The attendance book was signed by 25 Fellows (including 7 Members of the Council), 37 Associates (including 3 Members of the Council), 2 Hon. Associates, 5 Licentiates, and a number of visitors.

The Minutes of the Meeting held on 5 January 1925, having been taken as read, were confirmed and signed by the Chairman.

The Hon. Secretary announced the decease of Major Stewart Henbest Capper, M.A.Edin., F.S.A., R.C.A., elected Associate 1891; Thomas Morgan Bevan, elected Licentiate 1910; Francis Giesler Newton, elected Licentiate 1911, and it was Resolved that the regrets of the Royal Institute for the loss of these members be recorded in the Minutes and a message of sympathy and condolence be conveyed to their relatives.

The following member, attending for the first time since his election, was formally admitted by the Chairman: Mr. L. A. Culliford [*F.*].

Dr. Oscar Faber, O.B.E., D.Sc., having read a Paper on "Applications in Building and Foundations of Modern Engineering Construction," and illustrated it by lantern slides, a discussion ensued, and on the motion of Mr. H. D. Searles-Wood [*F.*], seconded by Mr. E. Fiander Etchells (Hon. Associate), a vote of thanks was passed to Dr. Faber by acclamation, and was briefly responded to.

The Secretary having read the Deed of Award of Prizes and Studentships made by the Council under the Common Seal, the sealed envelopes bearing the mottoes of the successful competitors were opened and the names disclosed.

The Meeting closed at 10.55 p.m.

R.I.B.A. JOURNAL.

It is desired to point out that the opinions of writers of articles and letters which appear in the R.I.B.A. Journal must be taken as the individual opinions of their authors and not as representative expression of the Institute.

Dates of Publication.—1924: 8th, 22nd November; 6th, 20th December. 1925: 10th, 24th January; 7th, 21st February; 7th, 21st March; 4th, 25th April; 9th, 23rd May; 13th, 27th June; 18th July; 15th August; 19th September; 17th October.

CORRECTION.

In the obituary of Mr. A. W. Sheppard in the last issue of the Journal it should have been stated that he had been recently elected a Fellow, and was no longer an Associate R.I.B.A.